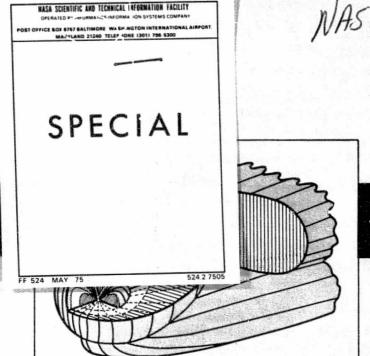
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IMS/Satellite Situation Center Report

Predicted Orbit Plots for Vela 5B - 1976

REPORT NO. 5

DECEMBER 1975



Tis/Satellite Situation Center Report

Predicted Orbit Plots for Vela 5B - 1976

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National Space Science Data Center/
World Data Center A for Rockets and Satellites
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

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I. INTRODUCTION

This report contains predicted orbit plots for the Vela 5B satellite for the time period January-December 1976. This satellite has been identified as an important possible contributor to the International Magnetospheric Study (IMS) project. The predicted orbit plots are shown in three projections. The time period covered by each set of projections is 4 days 16 hours, corresponding approximately to the period of Vela 5B. The three coordinate systems used are the Geocentric Solar Ecliptic system (GSE), the Geocentric Solar Magnetospheric system (GSM).

For the GSE system, the X-axis is along the Earth-Sun line toward the Sun, and the Z-axis is perpendicular to the ecliptic plane such that the Y-axis is toward dusk. The GSE projection at the top left of the set of three plots shows the satellite trajectory rotated into the X-Y plane in order to illustrate the relative positions of the satellite and the bow shock and magnetopause boundaries. Fairfield's model (1971) for the average position of these boundaries has been used. This model corresponds to a solar wind velocity of 420 km/sec. For positive X values, a spherical rotation of the satellite radius vector has been performed at constant ecliptic longitude. For negative X values, a cylindrical rotation of the Y and Z components of the radius vector has been performed at constant I.

For the GSM system, the X-axis is along the Earth-Sun line toward the Sun, and the X-Z plane contains the geomagnetic dipole such that the Z-axis is positive northward and the Y-axis is toward dusk. The GSM projection at the top right of the set of three plots shows the satellite trajectory projected onto the Y-Z plane in order to show the relative position of the satellite and the neutral sheet. A simple model for the neutral sheet is assumed: the sheet is hinged onto the geomagnetic equator at 10 Earth radii in the antisolar direction and lies in the GSM X-Y plane. The neutral sheet positions are shown as horizontal lines corresponding to six equally spaced times of the first day covered by the plot. The extent of the horizontal lines in Y has no significance. The projected trajectories are shown as solid lines for X < -10 Earth radii and as dashed lines for X > -10 Earth The dashed lines indicate that the satellite is not in the region of the neutral sheet regardless of Z values.

For the SM system, the Z-axis contains the north magnetic pole, and the Y-axis is perpendicular to the Earth-Sun line toward dusk. The satellite trajectory is shown at the bottom of the set of three plots as magnetic latitude and magnetic local time. These values of magnetic latitude and magnetic local time use SM latitude and longitude as a basis.

For each of the three projections, time ticks and codes are given on the satellite trajectories. The codes are interpreted in the table at the base of each plot. Time is given in the table as year/day/decimal hour. The total time covered by each plot is shown at the bottom of each table. An additional variable is given in the table for each time tick. For the GSM and SM projections this variable is geocentric distance to the satellite in Earth radii, and for the GSE projection the variable is satellite ecliptic latitude in degrees.

Actual spacecraft elements for the epoch April 1975 were used for the orbit predictions shown in this report. The predicted elements for January 1, 1976, are shown in Table 1.

II. VELA 5B ORBIT CHARACTERISTICS FOR 1976

The low inclination of the Vela 5B satellite precludes encounters with the direct access (cusp) region during undisturbed times, and thus the magnetic latitude/magnetic local time projections shown in this report are of limited value. However, Vela 5B provides a number of useful bow shock, magnetopause, and neutral sheet encounters throughout 1976.

The characteristics of the bow shock and magnetopause encounters do not vary throughout the year. Twice per revolution the satellite encounters the bow shock at positive $X_{\rm GSE}$, once in the noon/dusk quadrant, and once in the noon/dawn quadrant. In addition, twice per revolution the satellite encounters the magnetopause at negative $X_{\rm GSE}$, once in the midnight/dusk quadrant, and once in the midnight/dawn quadrant. Vela 5B spends between 34 percent and 38 percent of each rotation in the interplanetary medium and between 10 percent and 20 percent in the dayside and nightside magnetosheath regions.

Because the solar wind experiment is only operating partially (see section III), perhaps the most useful characteristic of the Vela 5B orbit in 1976 is the neutral sheet encounters. These are summarized in Table 2. There are 49 encounters in 1976, grouped into three time periods: Days 3-63, Days 139-251, and Days 314-366. During each of these time periods the neutral sheet encounters occur on consecutive revolutions (with two exceptions, Day 54 and Day 242) and progress from the dawn to the dusk magnetotail. Note that the times shown in Table 2 are approximate encounter times.

Of interest during 1976 is the close proximity of Vela 5B to Vela 6A. The separation distance of these two spacecraft and the envelopes of maximum and minimum separation per revolution are shown in Figure 1. The minimum separation distance is 0.41 Earth radii and occurs on Day 288 7 hours, when both spacecraft are interplanetary. The variation of the separation distance over the revolution encompassing this minimum is shown in the inset diagram.

III. SPACECRAFT AND EXPERIMENT STATUS

Brief descriptions of the eight Vela 5B experiments are given in pages 5-11; a summary of the operable experiments is shown in Table 3. All operable experiments are functioning normally, except the solar wind experiment. The detector designed to measure solar wind protons, alpha particles, and electrons failed; however, the detector designed to measure magnetotail electrons and protons and solar wind heavy ions is operating normally. Although none of the Vela 5B experimenters appear in the IMS Directory, S. J. Bame's solar wind experiment and S. Singer's electron detectors are listed under E. W. Hones, Jr. (Program Summary No. 197), who has been extensively involved in the data analysis of these experiments.

The Vela 5B spacecraft provides only real-time telemetry reception (approximately 25 percent), mainly by request when the spacecraft is in the magnetotail. The reception is enhanced by 50 percent during the spacecraft eclipse periods (months 1, 2, 3, 7, 8, and 9). No changes to this coverage are planned through 1977.

IV. FUTURE OPERATIONS

The Satellite Situation Center (SSC) maintains orbit prediction plots on 16-mm microfilm for Vela 5B of the type shown in this document for the time period January 1977 through December 1979. These plots may be obtained non request.

V. SPACECRAFT EXPERIMENT BRIEF DESCRIPTIONS

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SPACECRAFT COMMON NAME- VELA 58 ALTERNATE NAMES- VELA 10 (TRW). 03955 VELA 5B (USAF)

NSSDC ID- 69-046E

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/00/74.

LAUNCH DATE- 05/23/69 SPACECRAFT WEIGHT- 259. KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC

EPOCH DATE- 05/23/69
INCLINATION- 32.8 DEG ORBIT PERIOD- 6720. MIN PERIAPSIS- 111000. KM ALT APOAPSIS- 112000. KM ALT

RECENT ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/23/69
ORBIT PERIOD- 6720. MIN INCLINATION- 32.8 DEG
PERIAPSIS-'111000. KM ALT APOAPSIS- 112000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER: PS=PROJECT SCIENTIST)

SAN BERNADINO, CA

PS - John COONLOS ÁLAMOS SCI LAB LOS ALAMOS. NM

SPACECRAFT BRIEF DESCRIPTION

VELA 58 WAS ONE OF TWO SPIN-STABILIZED. ICOSAHEDRAL SATELLITES THAT COMPRISED THE SIXTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII. INCLINED AT 60 DEG TO THE ECLIPTIC. AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVE, OF THE SATELLITES WERE -- (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION. AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 58. AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES, HAD BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, INPROVED POWER REQUIREMENTS. BETTER THERMAL CONTROL OF OPTICAL SENSORS. AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT°S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENOS DE THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE AND ITS COMPLEMENT OF EXPERIMENTS FUNCTIONED SPACECRAFT FOR THREE YEARS. EXCEPT THAT THE SOLAR WIND NORMALLY ANALYZER FAILED IN JUNE 1969 AND THE EUV ELECTROSTATIC DETECTOR WAS TURNED OFF IN APRIL 1972. IN JUNE 1972 ONE OF TWO ONBOARD DATA STORAGE UNITS FAILED. USE OF THE REMAINING GODD UNIT WAS SUCH THAT NO USEFUL COSMIC GAMMA-RAY DATA WERE OBTAINED BETWEEN JUNE 1972 AND JANUARY 1974 WHILE STORAGE MODE DATA FOR THE OTHER EXPERIMENTS WERE AVAILABLE. FROM JANUARY TO JULY 1974 USEFUL COSMIC GAMMA RAY DATA WERE AGAIN OBTAINED. WHILE ALL OTHER EXPERIMENTS WERE TRACKED ONLY IN REAL TIME (ABOUT 30 PERCENT COVERAGE). AFTER JULY 1974 THE ONLY USEFUL DATA WERE REAL TIME.

----- VELA 58, BAME ----

EXPERIMENT NAME- SOLAR WIND EXPERIMENT

NSSDC ID- 69-046E-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY

AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/00/74.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER

OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - S.J. BAMELOS ALAMOS SCI LAB

OI - J.R. ASBRIDGELOS ALAMOS SCI LAB LOS ALAMOS. NM

OI - H.E. FELTHAUSERLOS ALAMOS SCI LAB

EXPERIMENT BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE DETECTOR UNIT WAS USED TO STUDY MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KV AND 8.3 KV. THIS UNIT IS OPERATING NORMALLY AT PRESENT. BUT HAS ABOUT

1/4 TO 1/3 DATA RECOVERY DUE TO REALLOCATION OF THE S/C TAPE RECORDER USAGE. THE OTHER DETECTOR UNIT. WHICH FAILED. WAS DESIGNED TO STUDY SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 V TO 5 KV.

EXPERIMENT NAME- NEUTRON DETECTOR

NSSDC ID- 69-046E-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/00/74. EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR: TL=TEAM LEADER DI=OTHER INVESTIGATOR. TM-TEAM MEMBER)

PI - SeJe BAMELOS ALAMOS SCI LAB LOS ALAMOS . NM

DI - Jaka ASBRIDGELOS ALAMOS SCI LAB LOS ALAMOS. NM

EXPERIMENT BRICE DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 8 LB) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIC COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 58. CHAMBERS ----------

EXPERIMENT NAME- TWO EXTREME ULTRAVIOLET DETECTORS 30 TO 150A. 120 TO 900A

NSSDC ID- 69-046E-01

LAST REPORTED STATE- INDPERABLE SINCE 04/00/72.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER QI=OTHER INVESTIGATOR. TM=TEAM MEMBER)

PI - Wete CHAMBERS -----------LOS ALAMOS SCI LAB

LOS ALAMOS, NM

OI - Jaca FULLERLOS ALAMOS SCI LAB LOS ALAMOS. NM

DI - W.E. KUNZLOS ALAHOS SCI LAB LOS ALAMOS. NM

EXPERIMENT BRIEF DESCRIPTION

TWO EXTREME ULTRAVIOLET DETECTORS WERE MOUNTED IN THE POSITIONS OF THE SPACECRAFT TO MEASURE SOLAR EUV APEX RADIATION. BOTH DETECTORS USED RETARDING POTENTIAL ANALYSIS OF PHOTO ELECTRONS TO OBTAIN APPROXIMATE SPECTRAL DATA OF THE

SOLAR FLUX. THE XUB (X-RAY ULTRAVIOLET OPEN) DETECTOR WAS AN OPEN WINDOW DEVICE DESIGNED TO COVER THE WAVELENGTH FROM 120 TO 900 A USING TEN RETARDING POTENTIAL STEPS FROM 7 TO 250 VOLTS. THE XUW (X-RAY ULTRAVIOLET WINDOW) DETECTOR COVERED THE RANGE 30 TO 150 A IN TEN ANALYZER STEPS FROM 75 TO 1000 VOLTS. BOTH DETECTORS WERE EQUIPPED WITH REPELLER GRIDS FOR CHARGED PARTICLE SUPPRESSION. THE ACCEPTANCE APERTURE WAS 20 DEG IN ONE DIMENSION. ALLOWING APPROXIMATELY A 3-SEC SCAN OF THE SUN. AND #50 DEG TO -50 DEG IN THE OTHER DIMENSION. THE XUD DETECTOR WAS READ OUT IN REAL TIME ONLY. THE XUW WAS READ OUT IN REAL TIME ONLY. THE XUW WAS READ OUT IN REAL TIME. AND IT STORED ABOUT ONE FOURTH THE AMOUNT OF REAL-TIME DATA. THE DETECTORS WORKED NORMALLY UNTIL AUGUST 1971 WHEN THEY BECAME ONLY PARTIALLY OPERABLE.

----- VELA 58, CHAMBERS ------

EXPERIMENT NAME- SOLAR X-RAY DETECTORS: 0.5 TO 3.0 A; 1 TO 8 A; 1 TO 16 A: 44 TO 60 A

NSSDC ID- 69-046E-02

LAST REPORTED STATE- INOPERABLE SINCE 01/00/74.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - W.H. CHAMBERSLOS ALAMOS SCI LAB

LOS ALAMOS, NM

OI - J.C. FULLERLOS ALAMOS SCI LAB

LOS ALAMOS. NM

OI - W.E. KUNZLOS ALAMOS SCI LAB LOS ALAMOS. NM

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR AMBIENT AND FLARE-PRODUCED FLUX OF X RAYS IN THE 0.3 TO 60 A WAVELENGTH REGION. TWO IDENTICAL X-RAY SENSOR UNITS WERE MOUNTED AT DIAMETRICALLY OPPOSED APEX POSITIONS ON THE SATELLITE. EACH UNIT CONTAINED FOUR DETECTORS -- THREE ION CHAMBERS AND A SCINTILLATION (NAI(T1)) DETECTOR. AS EACH ION CHAMBER HAD A HEMISPHERICAL WINDOW. THE COMBINED OUTPUT SIGNALS FROM IDENTICAL CHAMBERS IN EACH SENSOR UNIT APPROXIMATED THE RESPONSE OF AN IDEAL DETECTOR WITH A 4-PI STERADIAN FIELD OF VIEW. THE ION CHAMBERS HAD THE FOLLOWING MATERIALS. GAS FILLS. AND WAVELENGTH RESPONSES. CHAMBER 1 - 5.E-3 INCH OF BERYLLIUM. 0.9 ATM OF ARGON 4 0.1 ATM OF HELIUM, I TO 8 A. CHAMBER 2 - 2.5E-4 INCH OF MYLAR GVERCOATED WITH ABOUT AN 8500 A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN. 1 TO 16 A. CHAMBER 3 - 2.5E-4 INCH OF MYLAR, 0.5 ATM OF PITROGEN, 1 TO 16 A AND 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1 TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE

OBTAINED UPON SUITABLE ANALYSIS OF THE DATA SCINTILLATION DETECTOR USED FOR THE 0.3 TO 3 A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NAI CRYSTAL OPTICALLY COUPLED TO A PMT. THE OUTPUT OF WHICH FED A FIVE-LEVEL. INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS. THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD ONE-HALF-INCH-DIAMETER: 1-MM-THICK CRYSTAL COVERED BY A FLAT 10-MIL-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR A ONE-QUARTER-INCH-DIAMETER. (1.E-2 ERG/SQ CM-SEC) HAD 1-MM-THICK CRYSTAL AND A 0.08 INCH-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 10-MIL WINDOW MOUNTED ON THE FACE OF BOTH ION CHAMBERS AND SCINTILLATION DETECTORS THE CRYSTAL. WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 SECONDS. THE AVERAGE DETECTIVE EFFICIENCIES FOR THE ION AND SCILTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 5B, CONNER ------

EXPERIMENT NAME- COSMIC X RAYS

NSSDC ID- 69-046E-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/00/74.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER

OI=OTHER INVESTIGATOR. TM=TEAM MEMBER)

PI - J.P. CONNERLOS ALAMOS SCI LAB LOS ALAMOS, NM

OI - ReD. BELIANLOS ALAMOS SCI LAB LOS ALAMOS. NM

EXPERIMENT BRIEF DESCRIPTION

THE COSMIC X-RAY DETECTOR WAS A LARGE-AREA (26 CM SQUARED) SODIUM IODIDE SCINTILLATOR WITH A 5-MIL BERYLLIUM WINDOW. THE EXPERIMENT WAS DESIGNED TO PROVIDE MEASUREMENTS OF THE LOCATION, INTENSITY, AND INTENSITY VARIATIONS OF NONSOLAR X-RAY SOURCES OVER A LONG PERIOD OF TIME, THE DETECTOR WAS SENSITIVE TO X-RAY PHOTONS IN TWO ENERGY INTERVALS - (3 TO 6 KEV AND 3 TO 12 KEV), AND WAS SUFFICIENTLY SENSITIVE TO MONITOR FROM SIX TO TWELVE GALACTIC X-RAY SOURCES. ANY ONE SOURCE WAS VIEWED FOR APPROXIMATELY 1 HR. AND EVERY 2 DAYS EACH SOURCE WAS BACK IN VIEW. THREE MODES OF READOUT WERE AVAILABLE - (1) THE REAL TIME NORMAL MODE. IN WHICH COUNTS FROM EACH ENERGY CHANNEL WERE TRANSMITTED EVERY SEC. (2) THE HIGH RESOLUTION MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS TRANSMITTED EIGHT TIMES PER SEC. AND (3) THE STORE MODE, IN WHICH ONLY THE 3- TO 12-KEY CHANNEL WAS STORED.

----- VELA 5B, KLEBESADEL -----

EXPERIMENT NAME- GAMMA RAY ASTRONOMY

NSSDC ID- 69-046E-08

LAST REPORTED STATE- IN OPERABLE SINCE 07./00/74

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR. TL=TEAM LEADER OI=OTHER INVESTIGATOR. TM=TEAM MEMBER)

PI -- R.W. KLEBESADELLOS ALAMOS SCI LAB LOS ALAMOS NM

O: - I P. STRONGLOS ALAMOS SCI LAB

OI - R.A. DLSONLOS ALAMOS SCI LAB

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10-CM-CUBED CESIUM IDDIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID. STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INSTITUTED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE WHICH. COUPLED WITH THE ISOTROPIC RESPONSE. IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/SEC.

----- VELA 58, SINGER -----

EXPERIMENT NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 69-046E-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY

AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/00/74.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER

OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - S. SINGERLOS ALAMOS SCI LAB LOS ALAMOS. NM OI - Made MONTGOMERYLOS ALAMOS SCI LAB

EXPERIMENT BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION. THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE. DRIENTED AT ANGLES OF 45 DEG. 90 DEG. AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA SB, SINGER -

EXPERIMENT NAME- ELECTRON DETECTORS

NSSDC ID- 69-046E-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY

AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/00/74.

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER

OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - S. SINGERLOS ALAMOS SCI LAB

OI - M.D. MONTGOMERYLOS ALAMOS SCI LAB

EXPERIMENT BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAY IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG. 90 DEG. AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

REFERENCE

Fairfield, D. H., "Average and Unusual Locations of the Earth's Magnetopause and Bow Shock," J. Geophys. Res., 76, 28, 6700, October 1971.

Table 1. ORBIT PARAMETER SUMMARY TABLE FOR VELA 5B

Alternate Satellite Names	Vela 10 (TRW) 03955 Vela 5B (USAF)
International ID	69-046E
Epoch (YY-MM-DD-HH-Mi)	76-01-01-00-00
Period (min)	6704.1
Eccentricity	.032
Inclination (deg)	43.03
R.A. of Ascending Node (deg)	107.83
Argument of Perigee (deg)	72.88
Mean Anomaly (deg)	148.11
Semimajor Axis (km)	117790.
Perigee Height (km)	107680.
Apogee Height (km)	115140.

Table 2. VELA 5B NEUTRAL SHEET ENCOUNTERS FOR 1976

Time (day/hr)	YGSM (Earth radii)	Geocentric Distance (Earth radii)	Time (day/hr)	YGSli (Earth radii)	Geocentric Distance (Earth radil)
3/1	-5	18.1	191/10	-2	18.8
7/16	-3	18.1	196/2	-2	18.8
12/9	-2	18.1	200/16	+1	18.7
17/0	-1	18,1	205/12	+2.5	18.8
21/15	0	18.1	209/23	+3.5	18.8
26/6	+2	18.2	214/13	+8	18.8
30/20	+6	18.2	219/6	+8	18.7
35/13	+6	18.2	223/21	+9	18.7
40/0	+7	18.3	228/10	+13	18.6
44/21	+10	18.2	233/3	+12.5	18.7
49/12	+10	18.1	237/21	+12	18.8
58/20	+13.5	18.2	247/4	+15	18.7
63/13	+12.5	18.1	251/21	+15	18.8
139/23	-14	18.6	314/11	-14	18.3
144/16	-13	18.6	319/5	-1.3	18.3
149/16	-13	18.8	324/1	-13	18.2
153/23	-12	18.6	328/13	- 12	18.3
158/17	-11	18.7	333/5	-11	18.3
163/8	-10	18.6	338/1	-11	18.2
168/0	-8	18.7	342/13	-9	18.2
172/17	-7.5	18.7	347/6	-8.5	18.2
177/12	-7	18.6	352/1	-7	18.1
182/1	-5	18.8	356/15	-7	18.0
186/17	-3	18,8	361/6	-4	18.1
	1		366/0	-2.5	18.0
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Table 3. VELA 5B OPERABLE EXPERIMENT STATUS SUMMARY

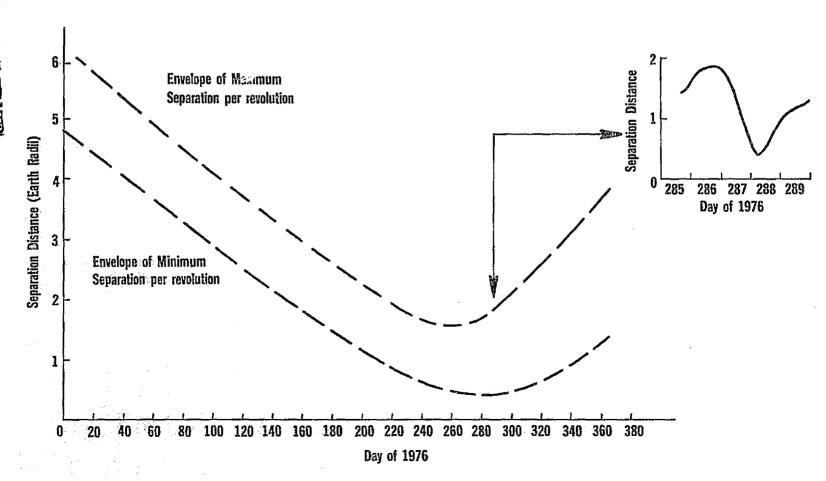
Experiment	Principal Investigator	Status
Solar Wind Experiment	S. J. Bame	Par
Neutron Detector	S. J. Bame	Op
Cosmic X rays	J. P. Conner	Ор
Solar Particle Telescopes	S. Singer	Ор
Electron Detectors	S. Singer	Op

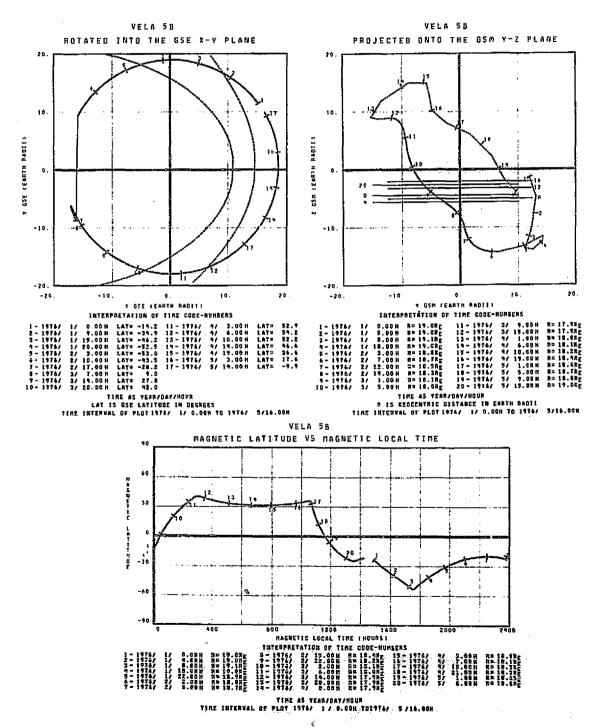
Op: Normal Detector Operation Par: Partial Detector Operation

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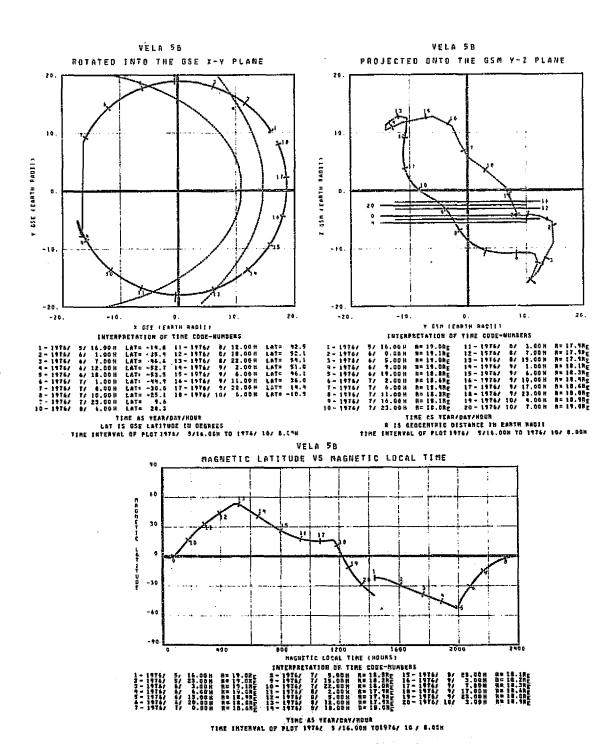
Figure 1. Vela 5B and Vela 6A Separation Distance for 1976

Minimum Separation 0.41 R_E Day 288 7h

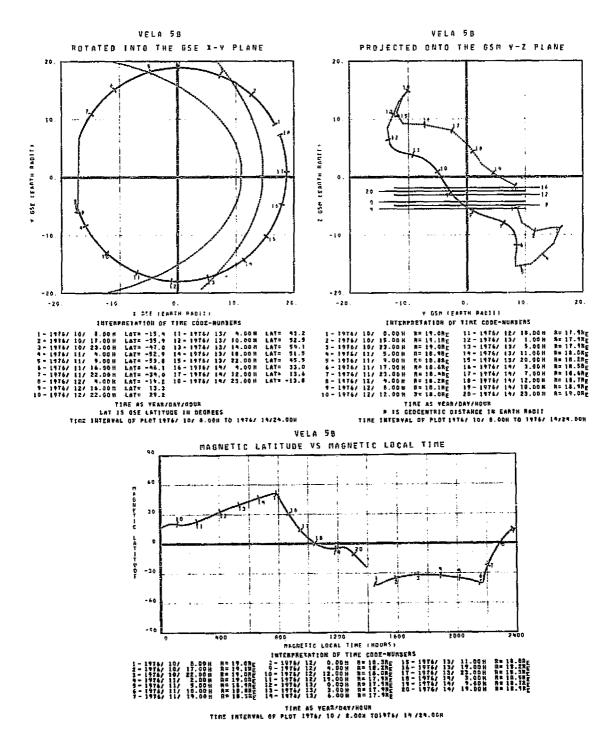


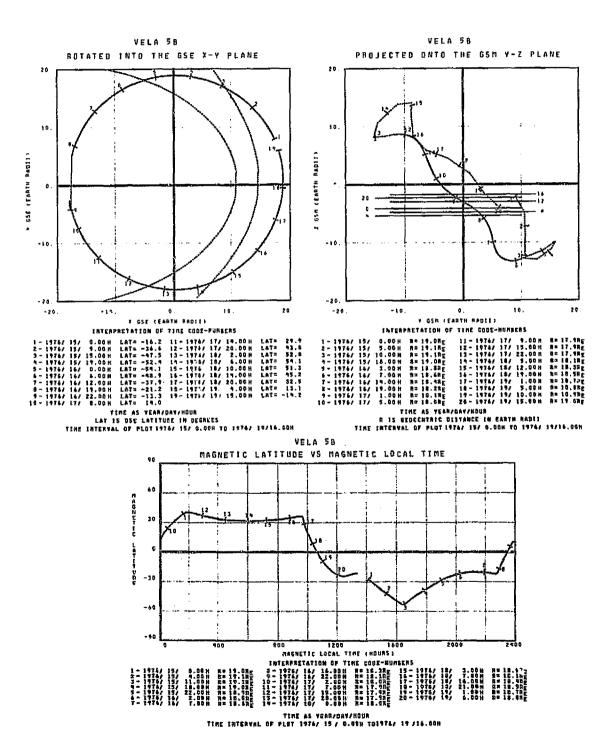


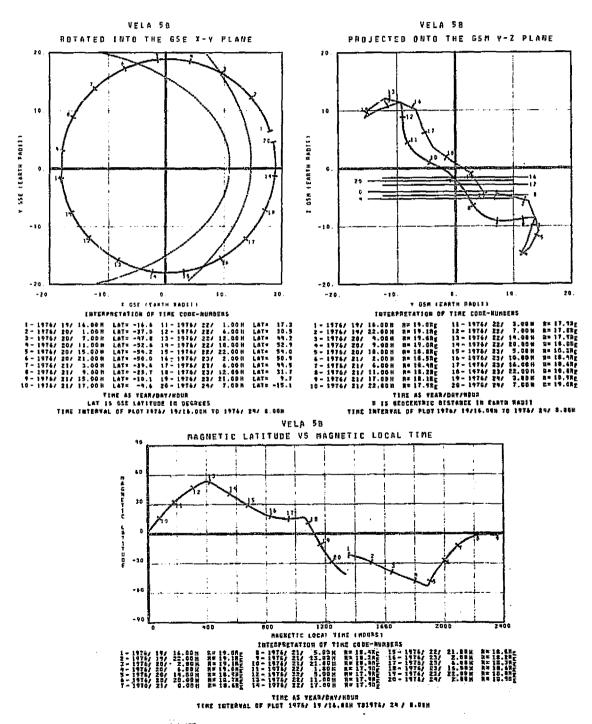
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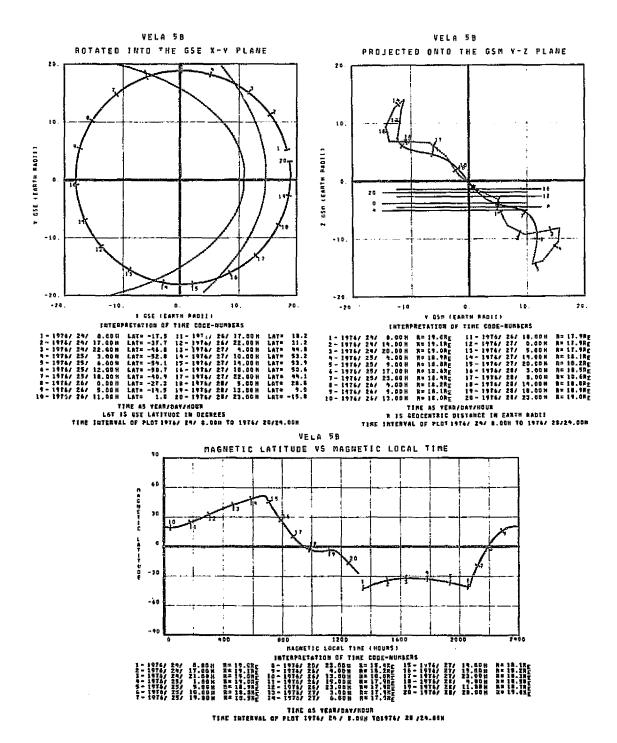
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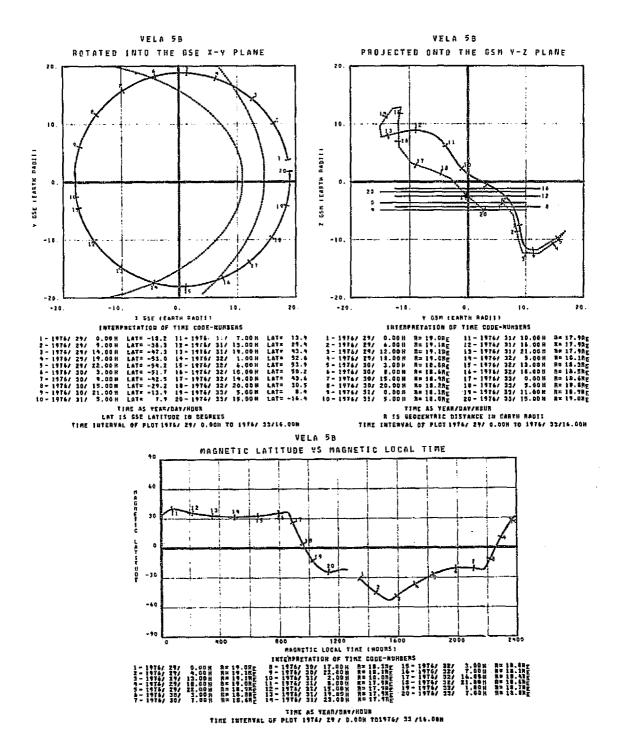


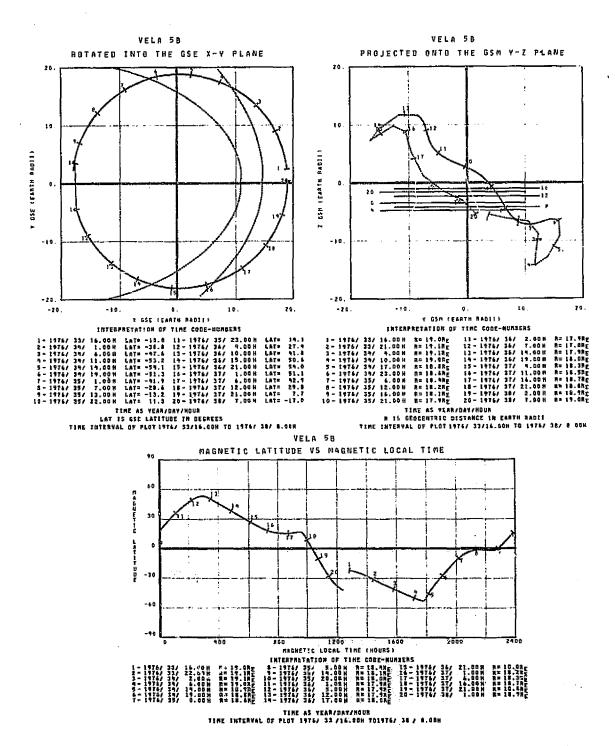


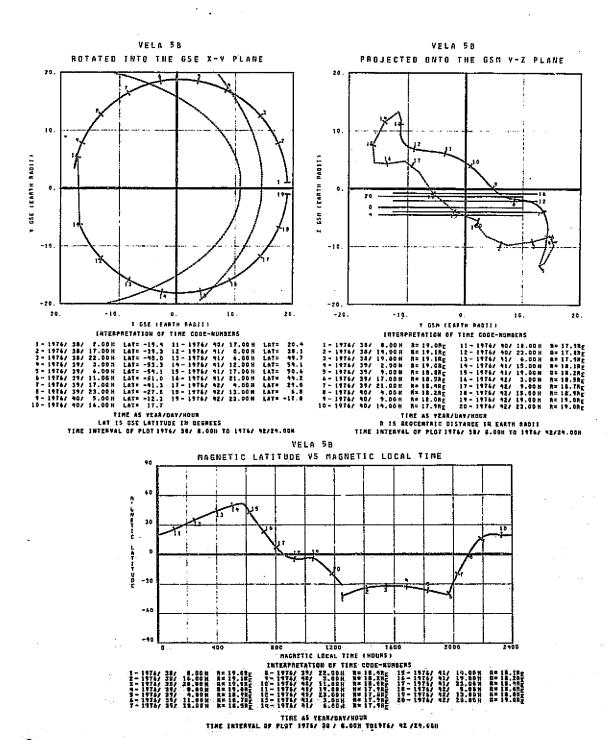


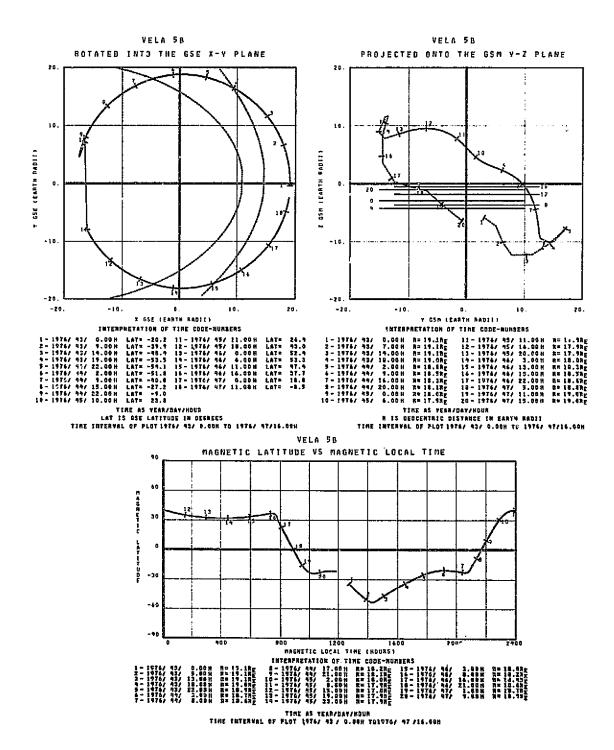
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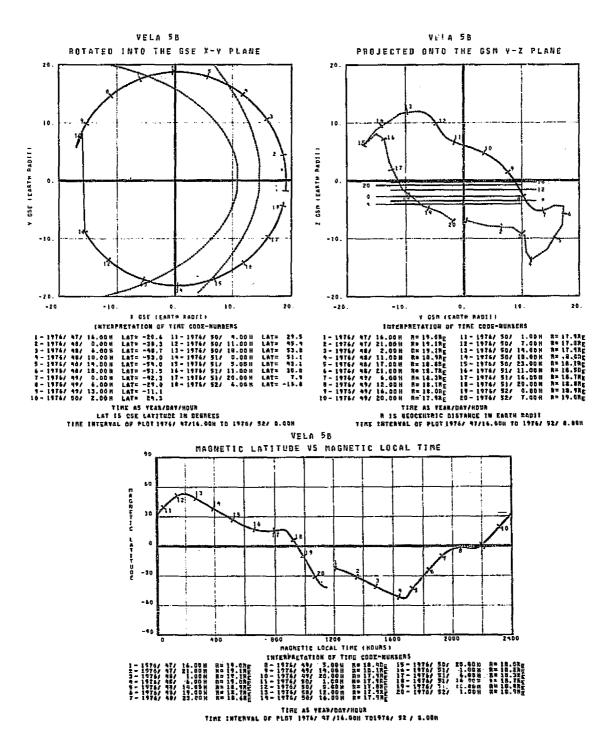


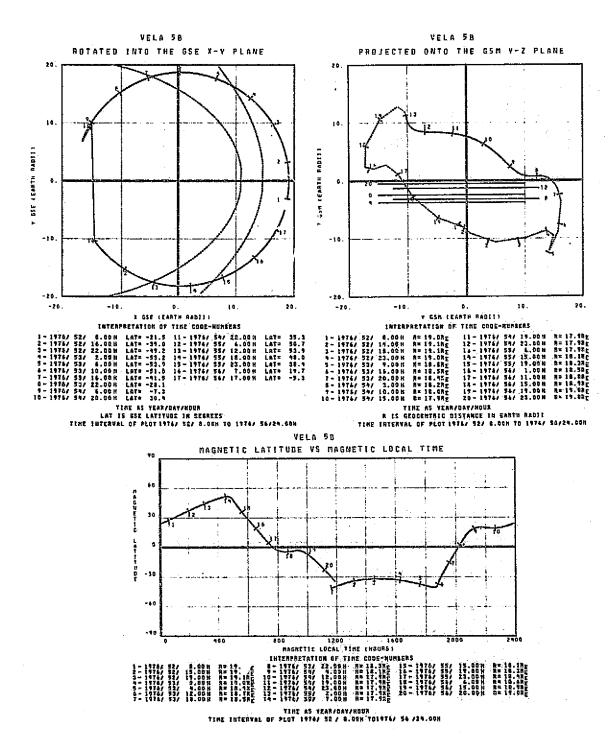


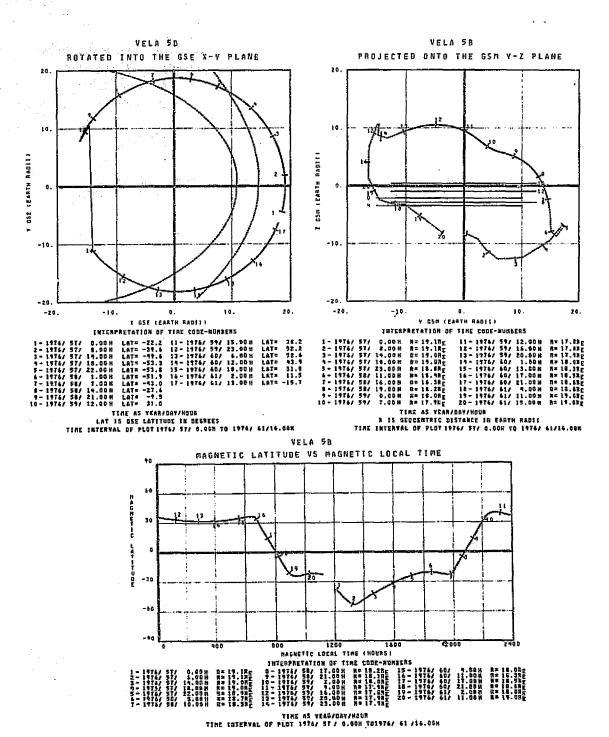






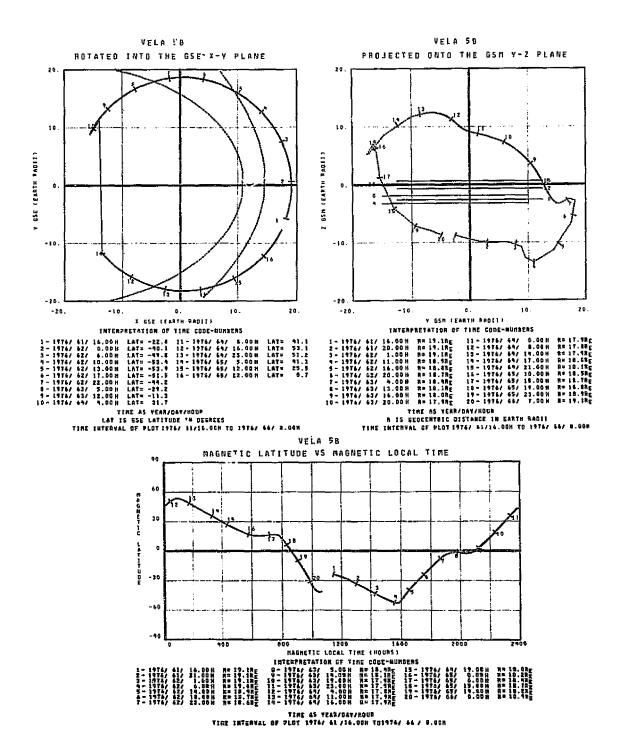




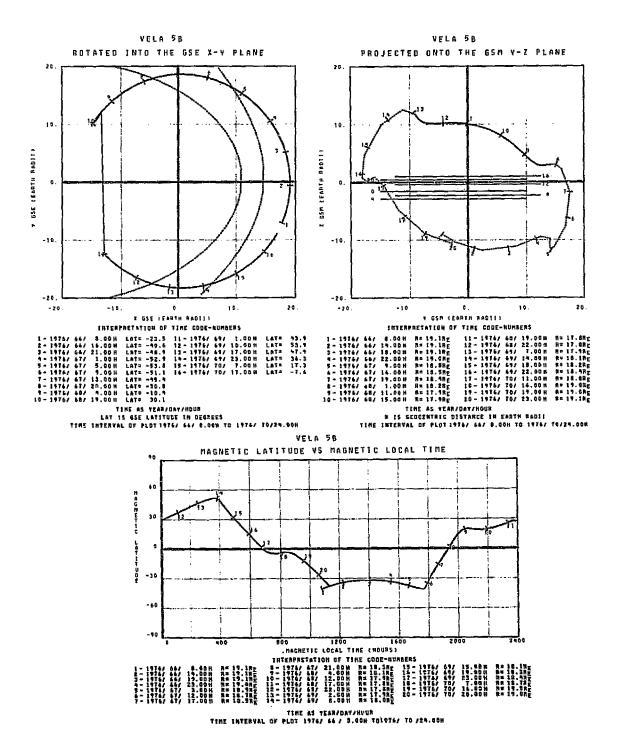


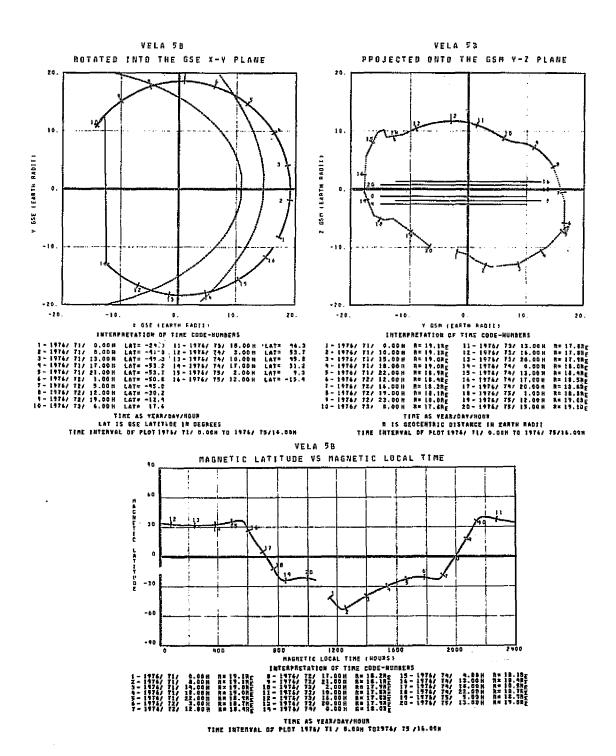
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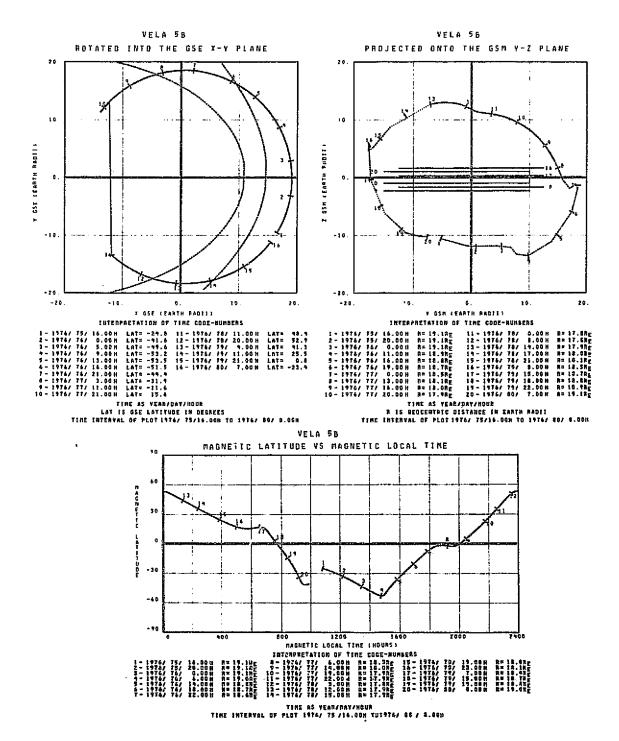
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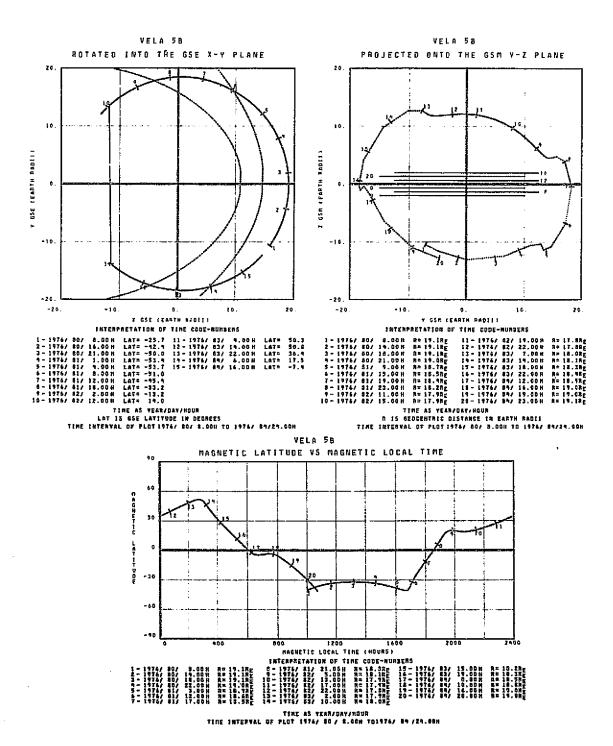


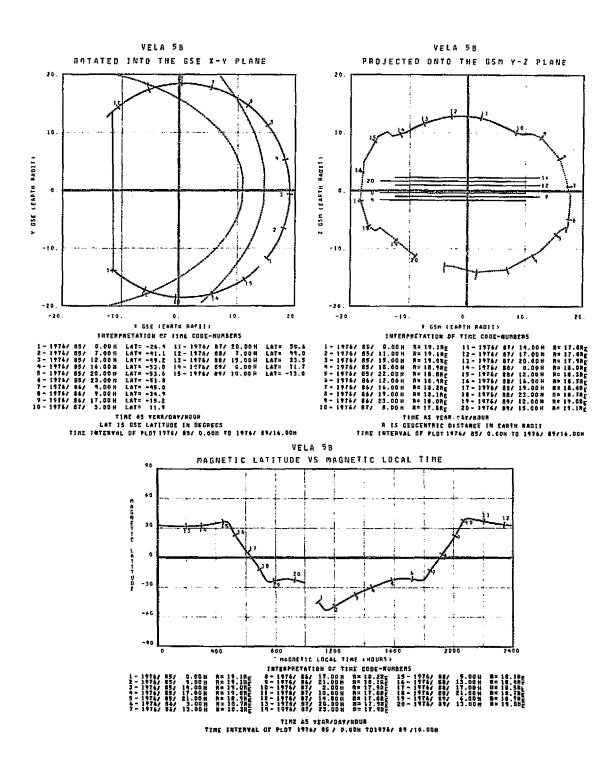
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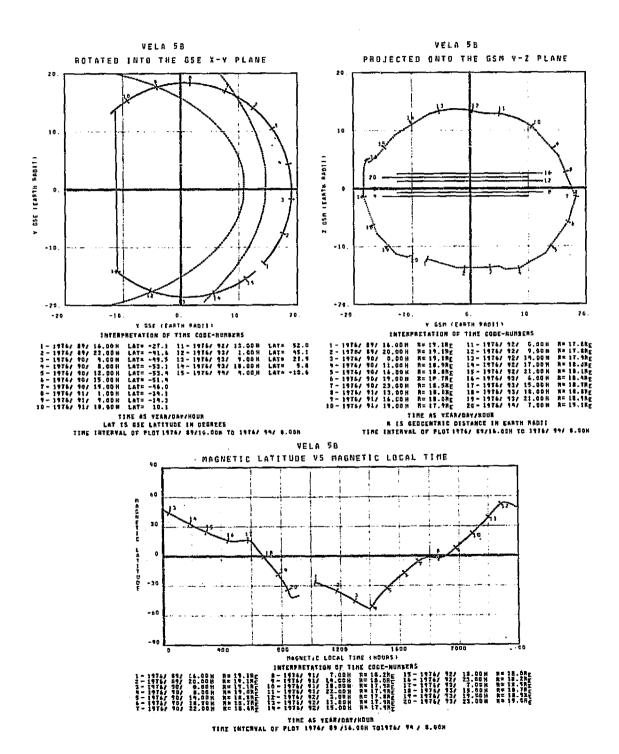


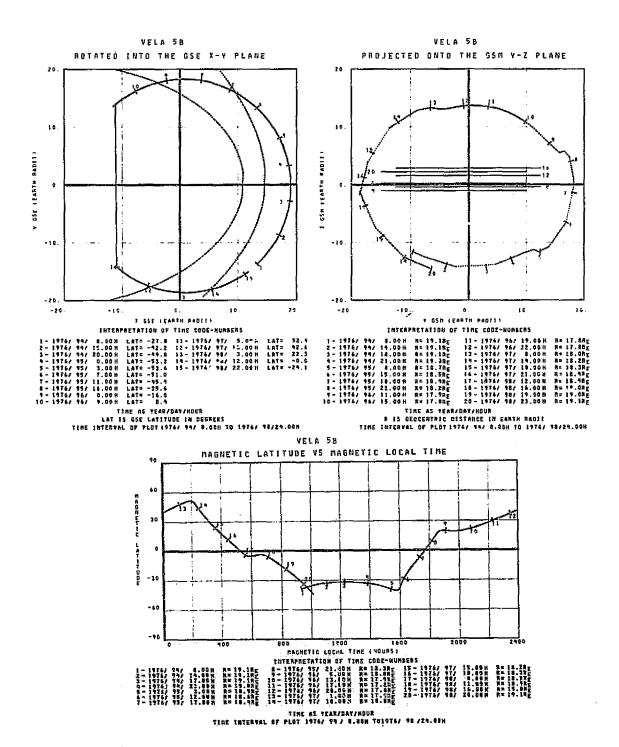


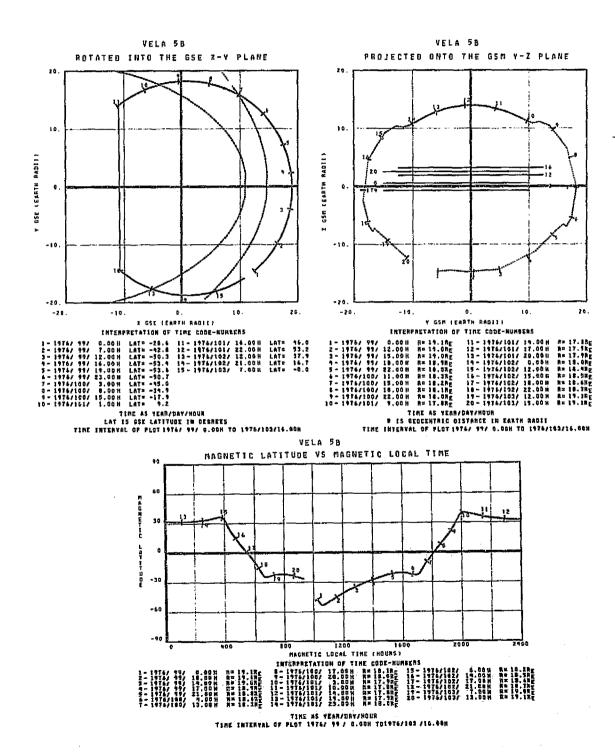


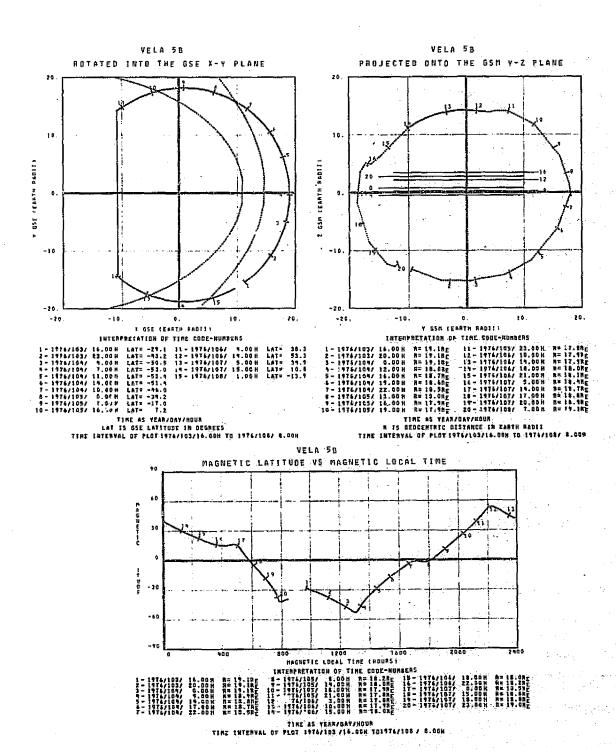


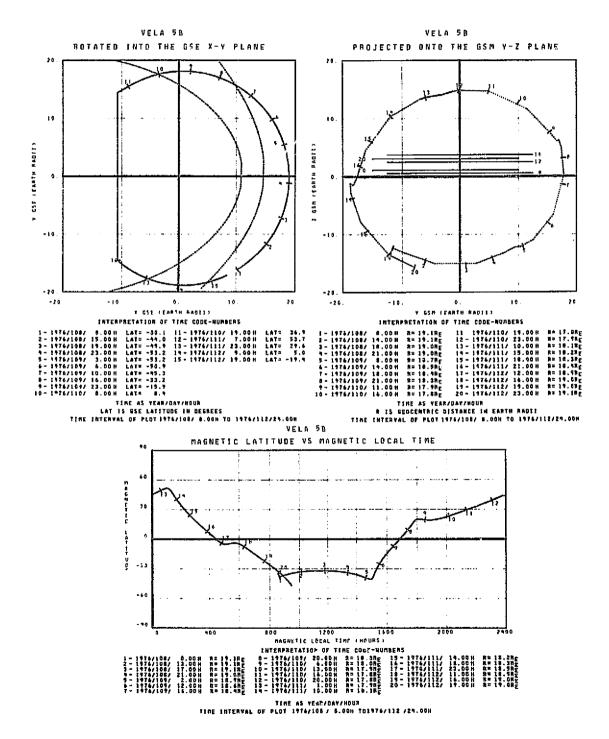
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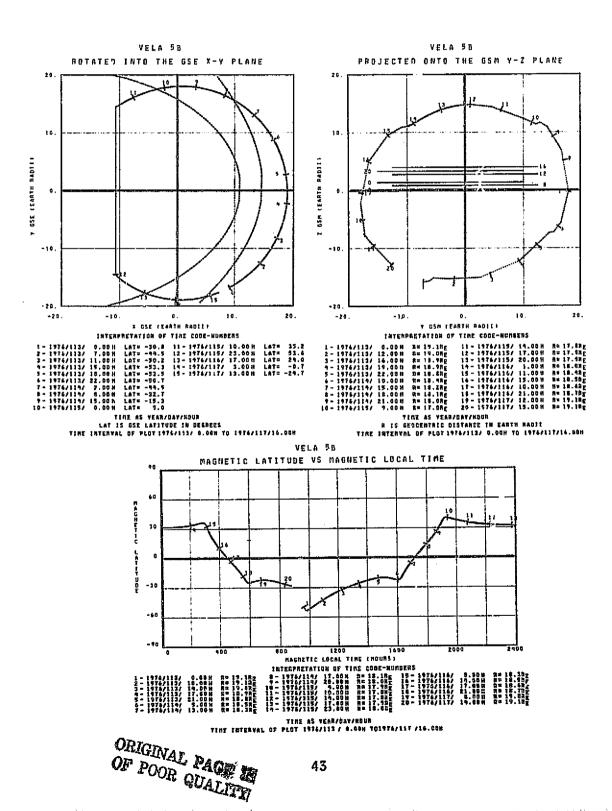




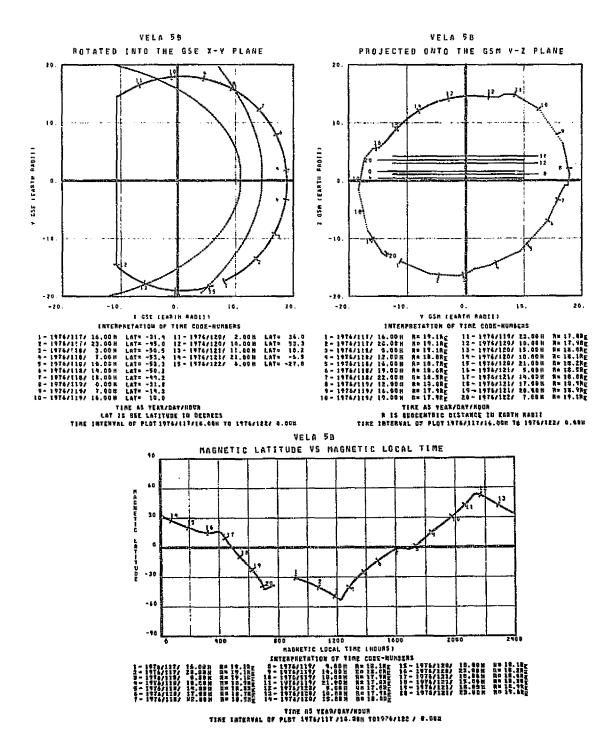






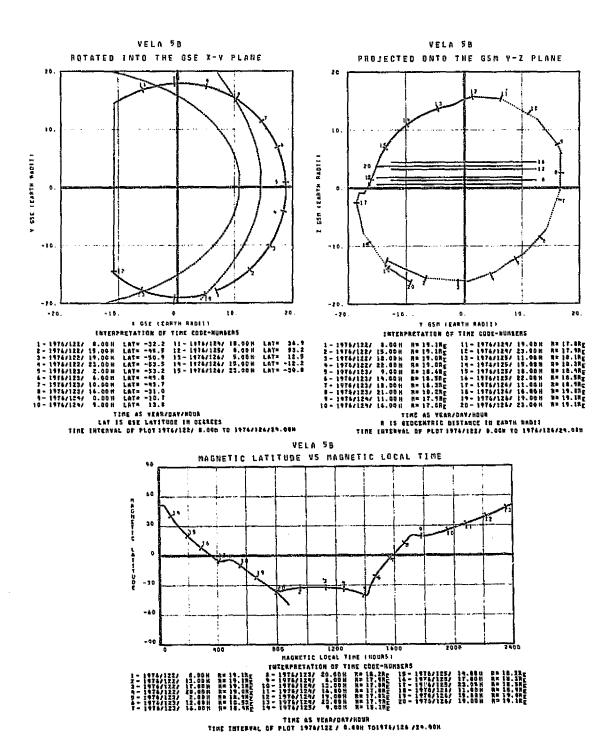


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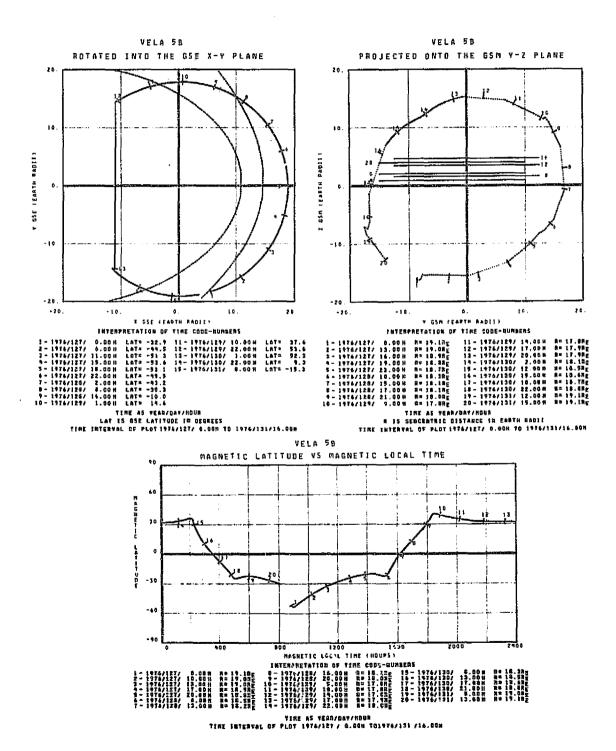


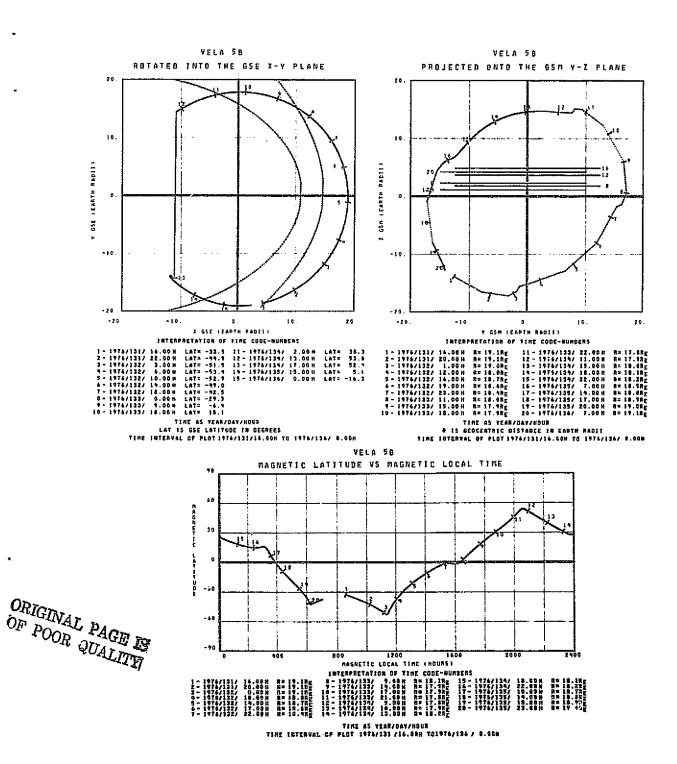
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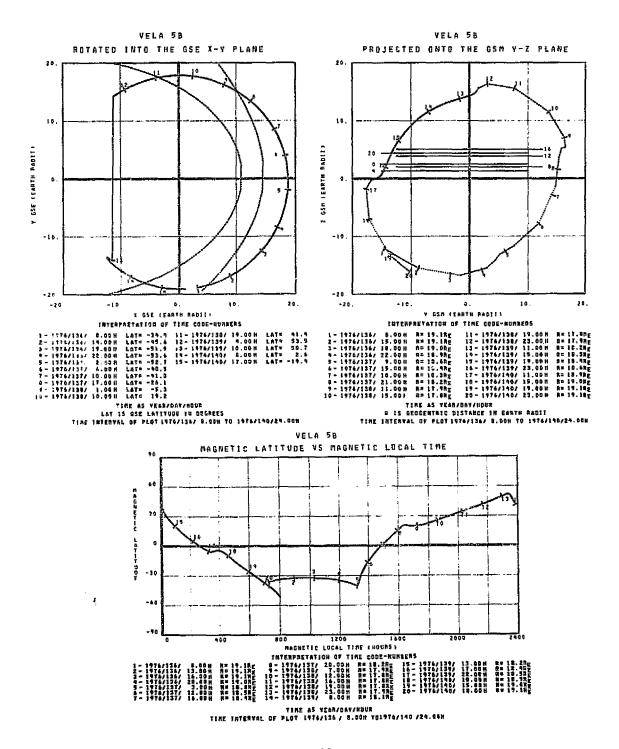
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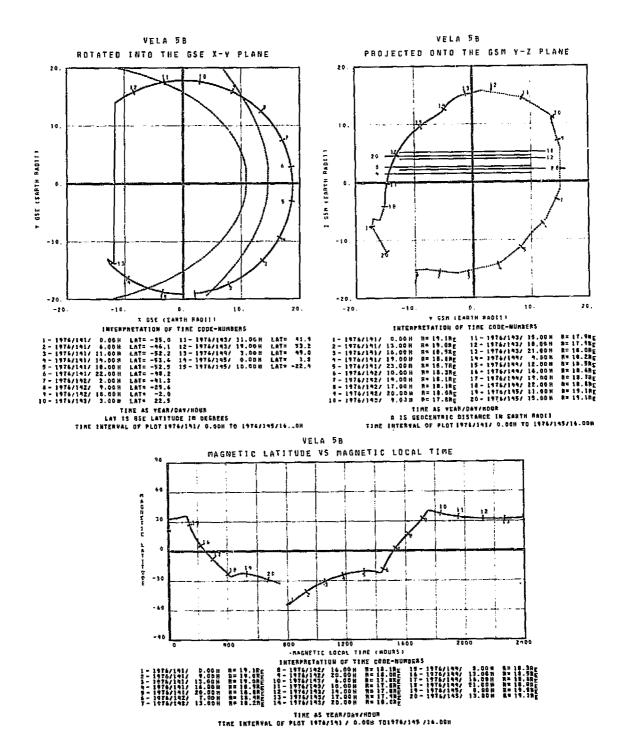


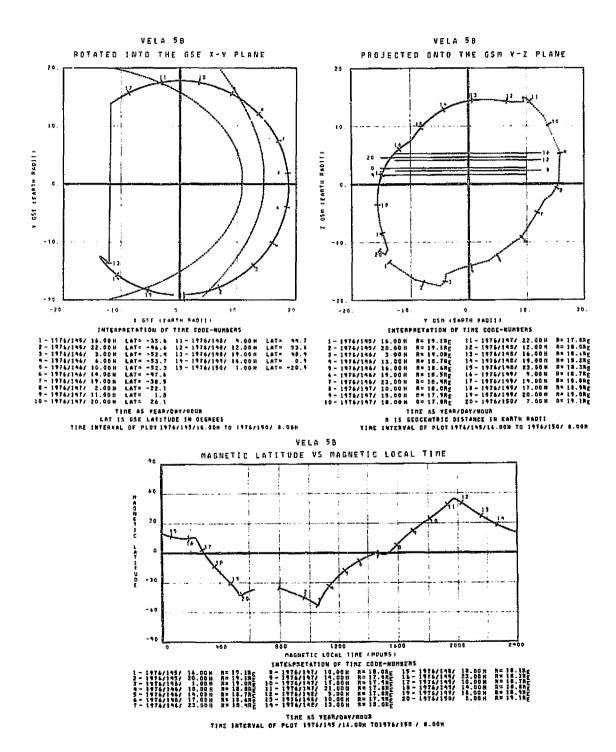
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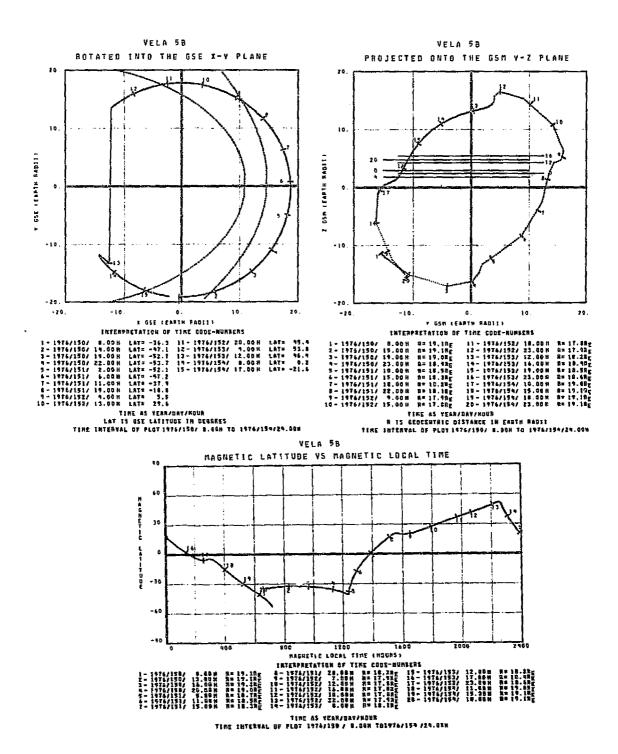




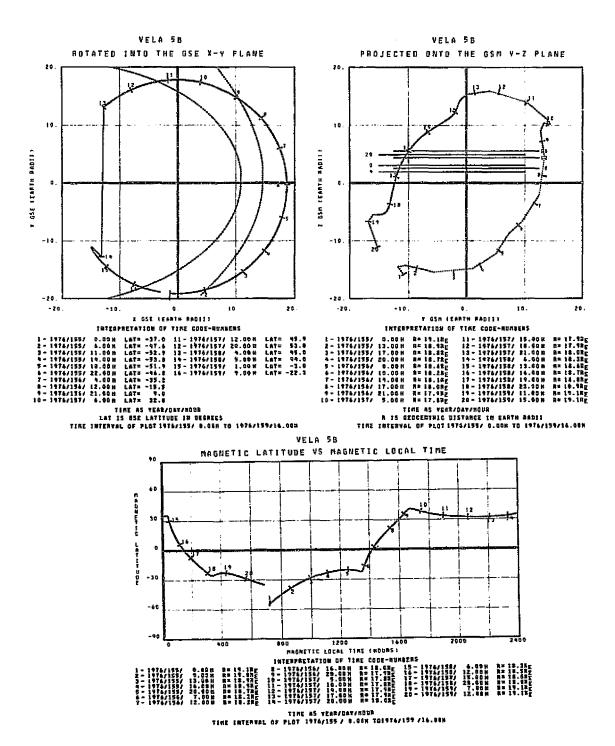


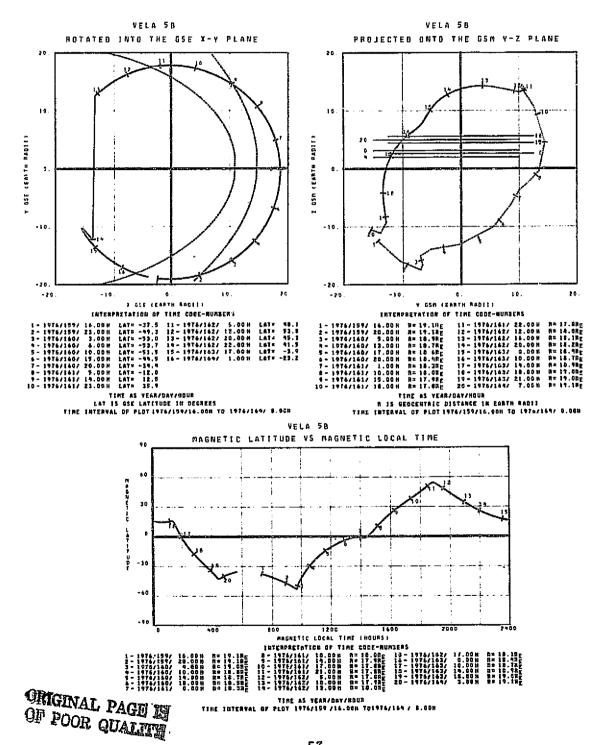


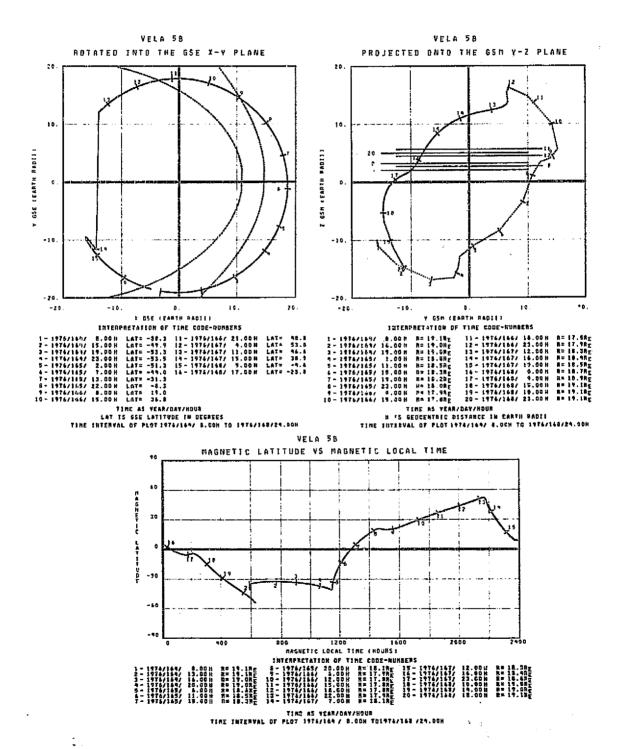
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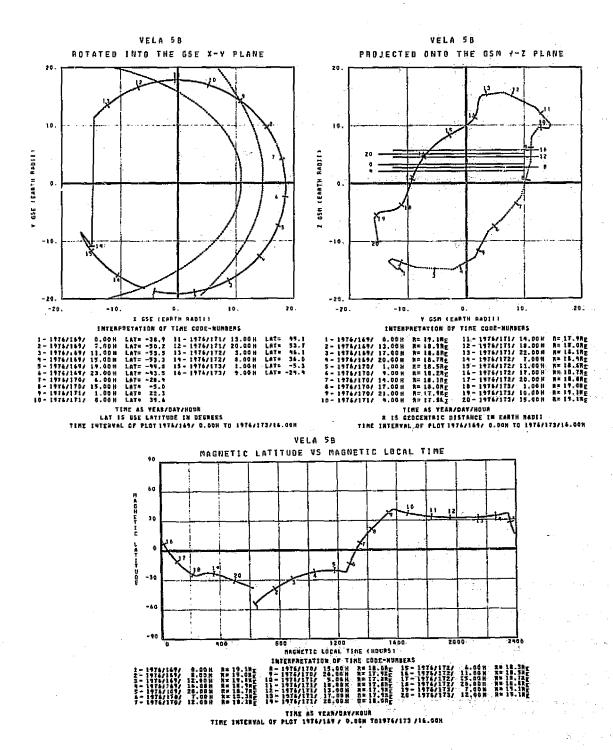
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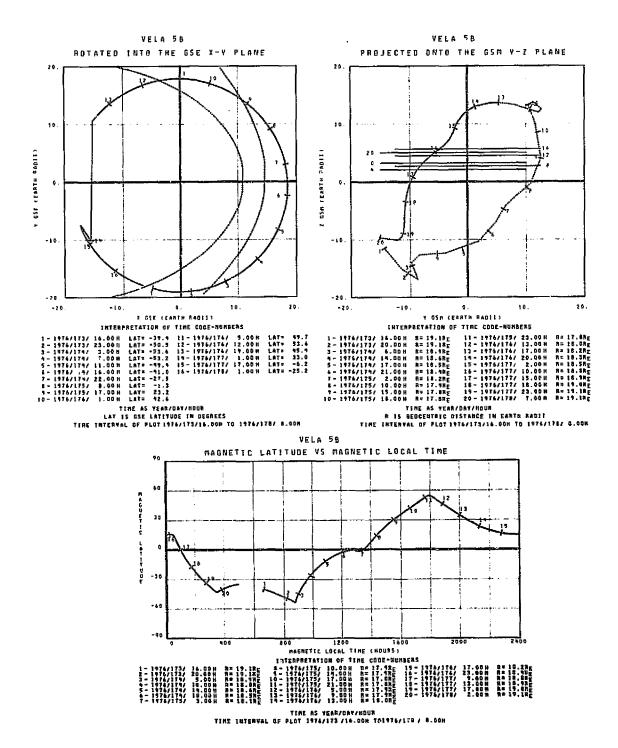


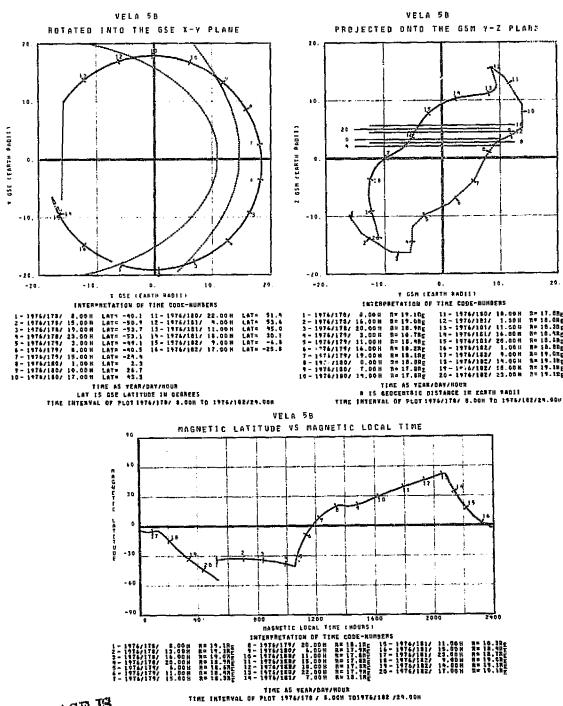




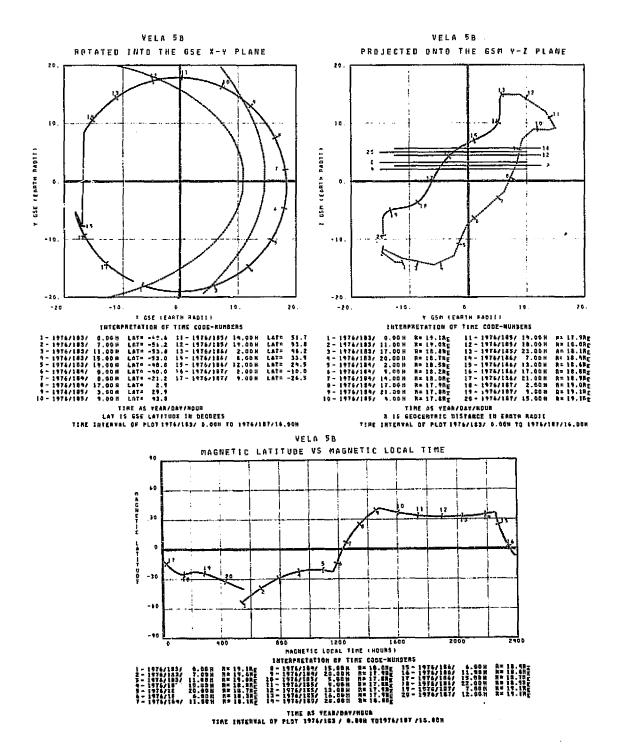
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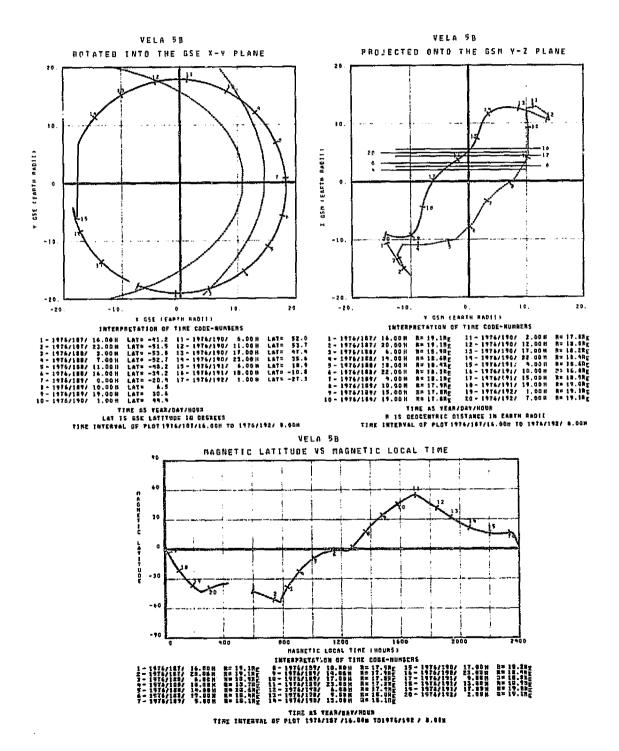
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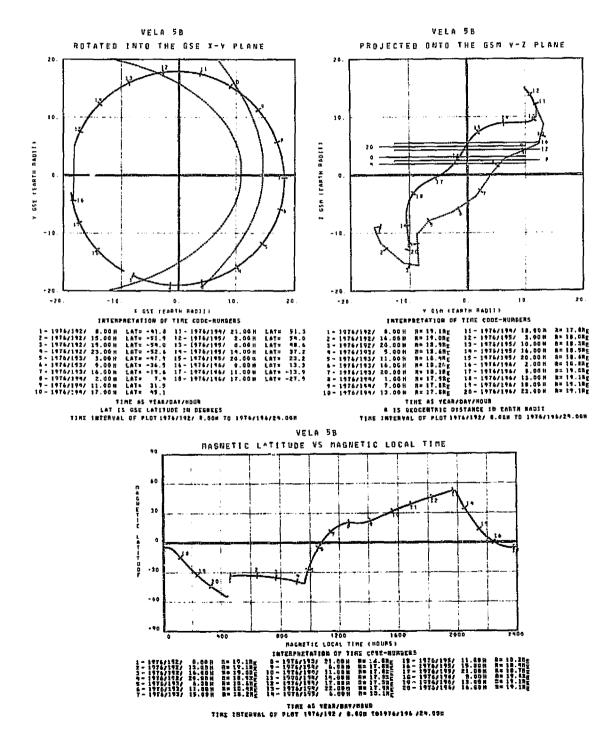
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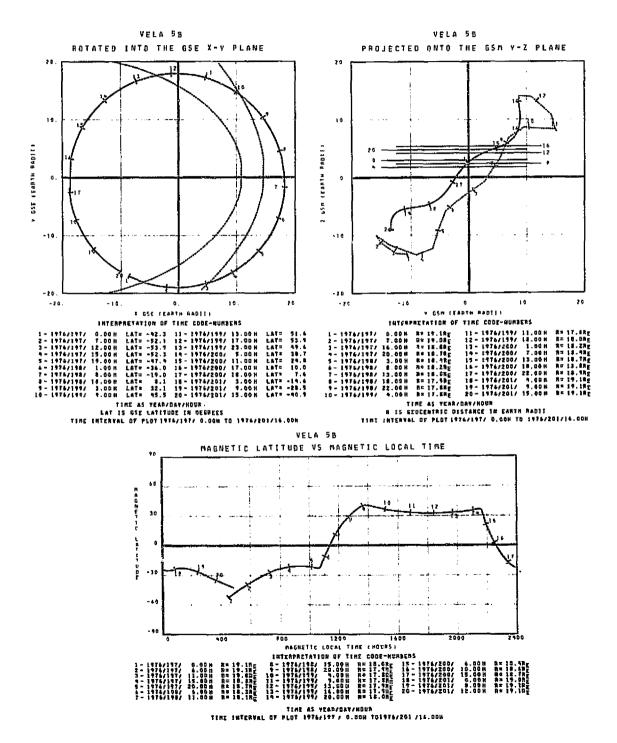
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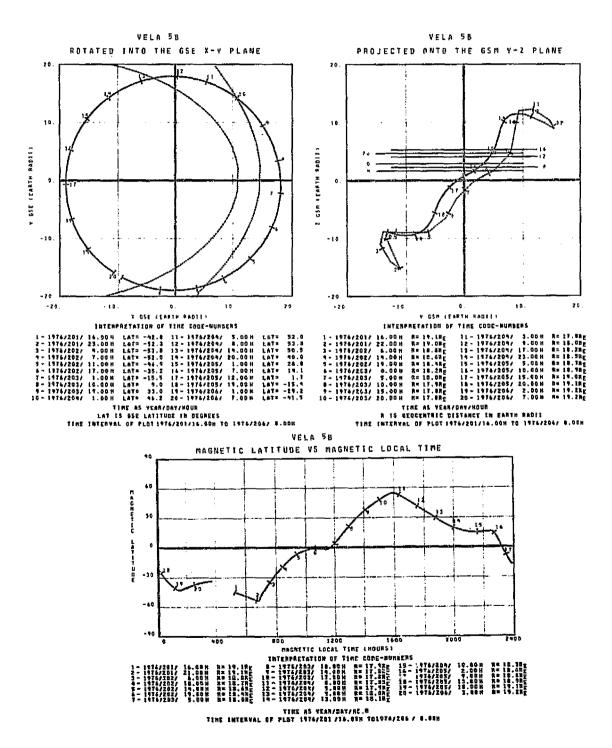
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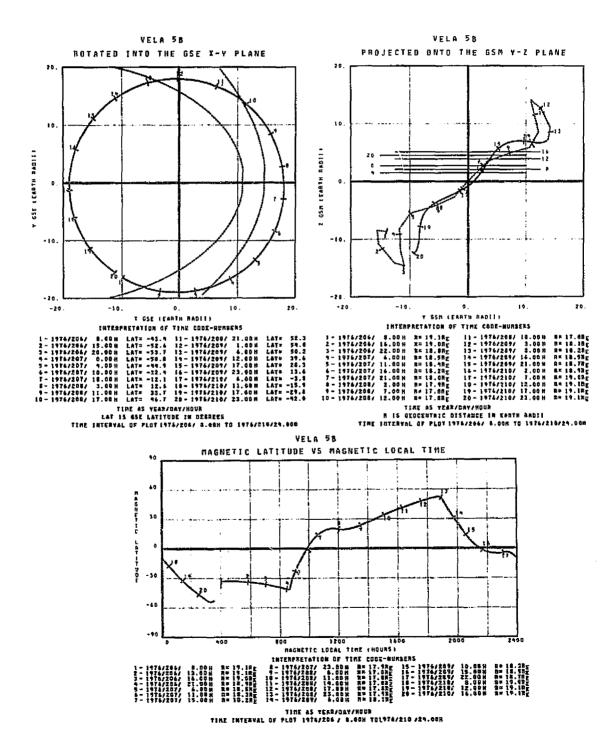


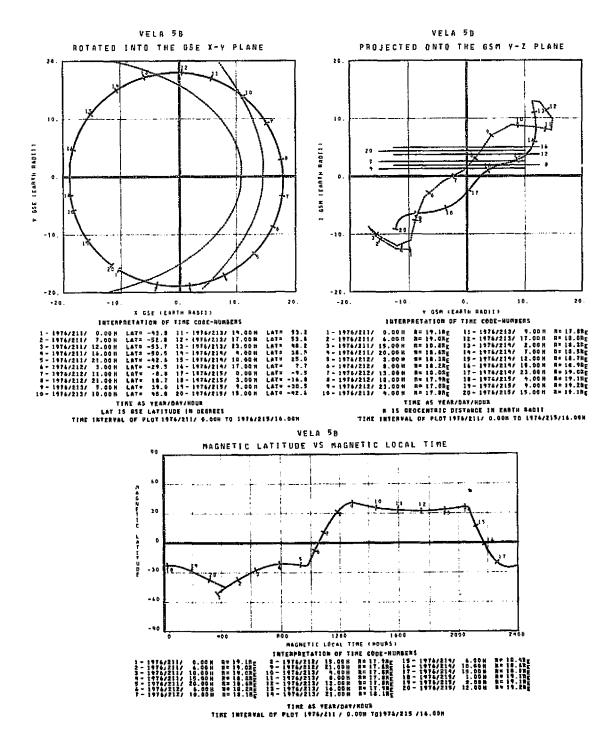
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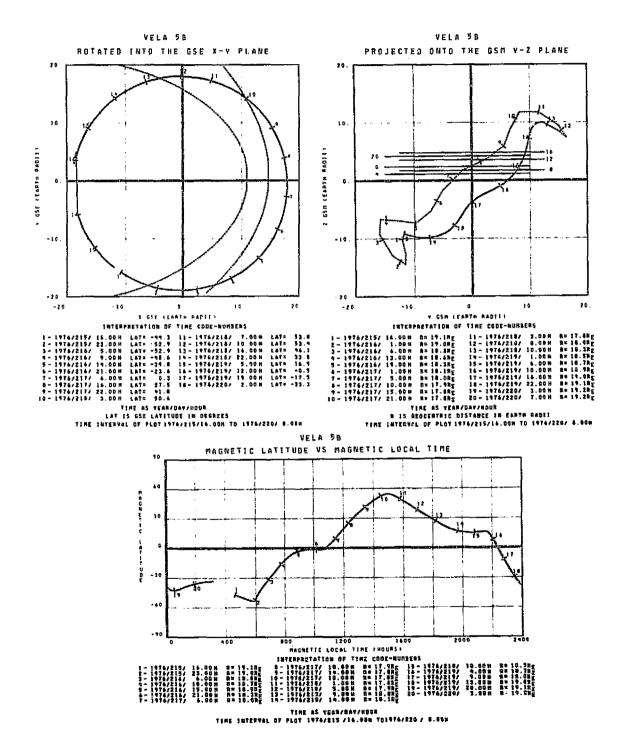


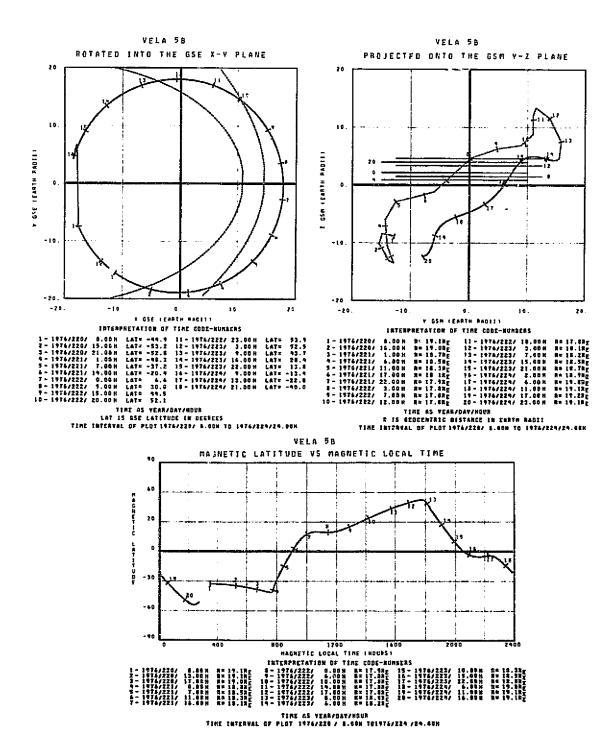


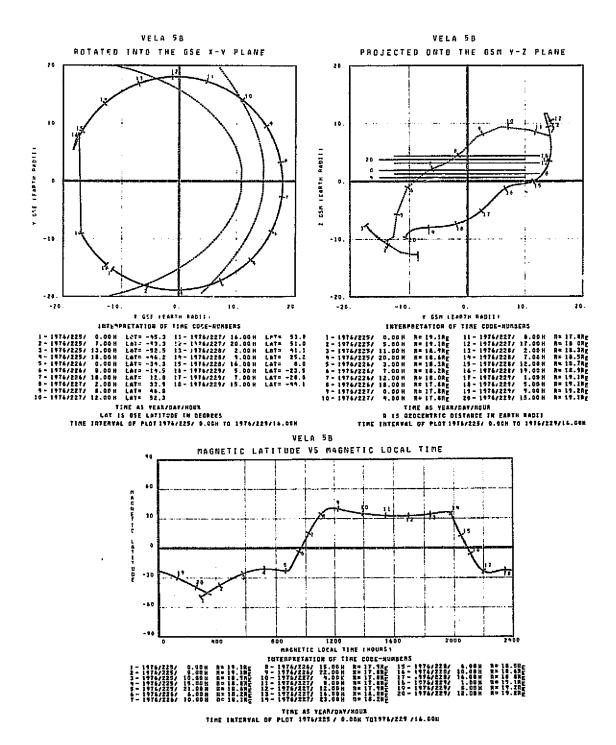


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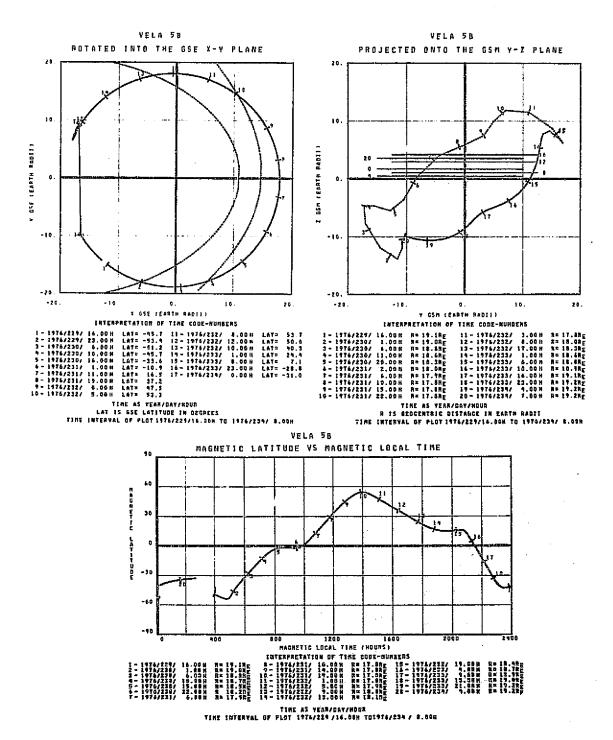
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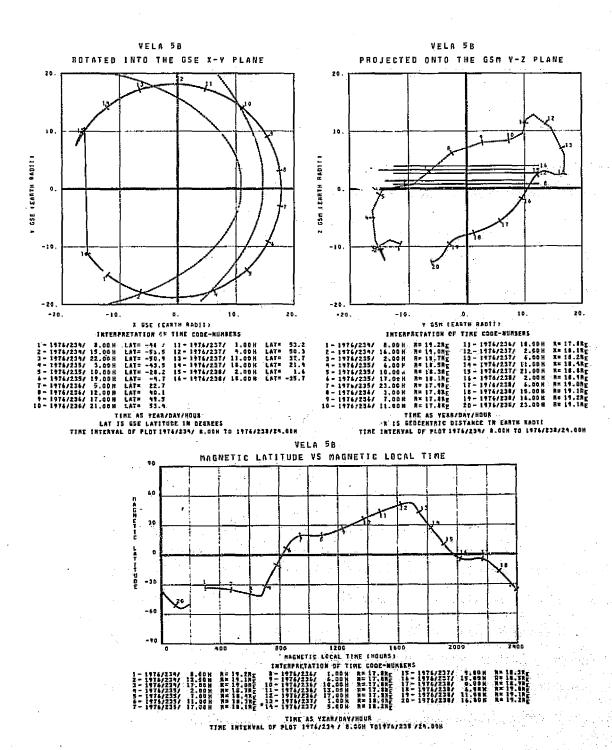
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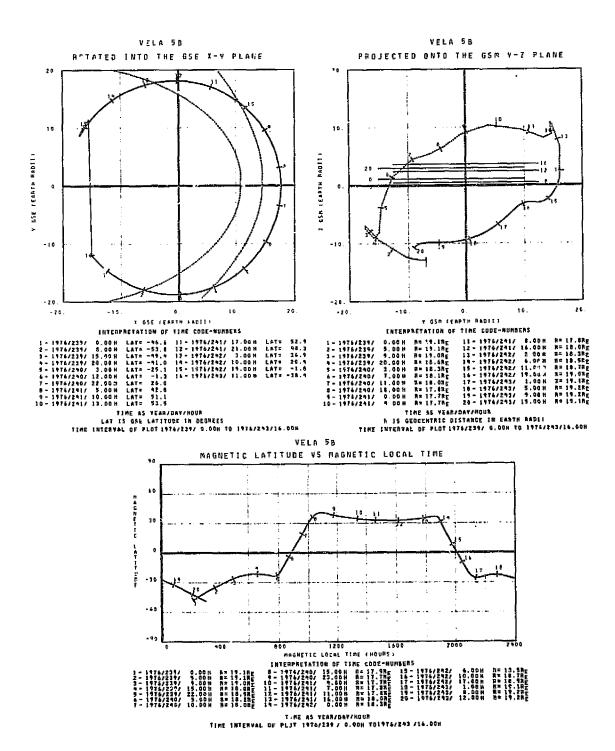


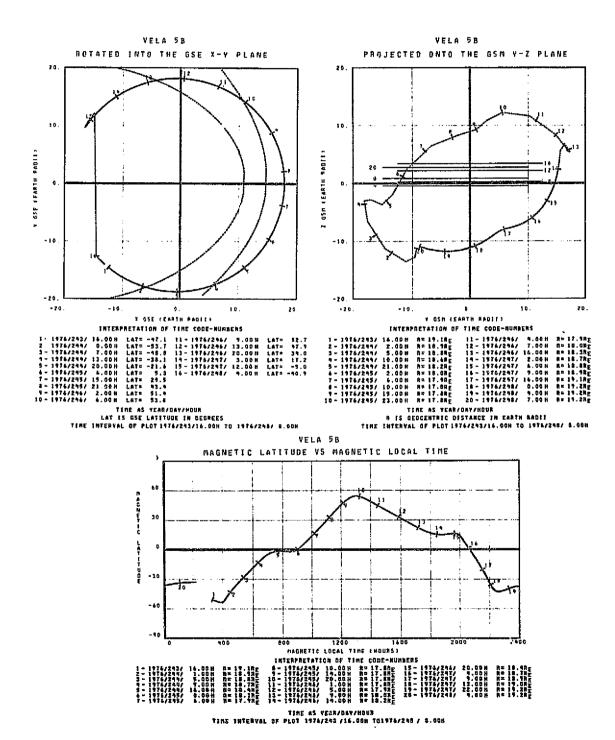
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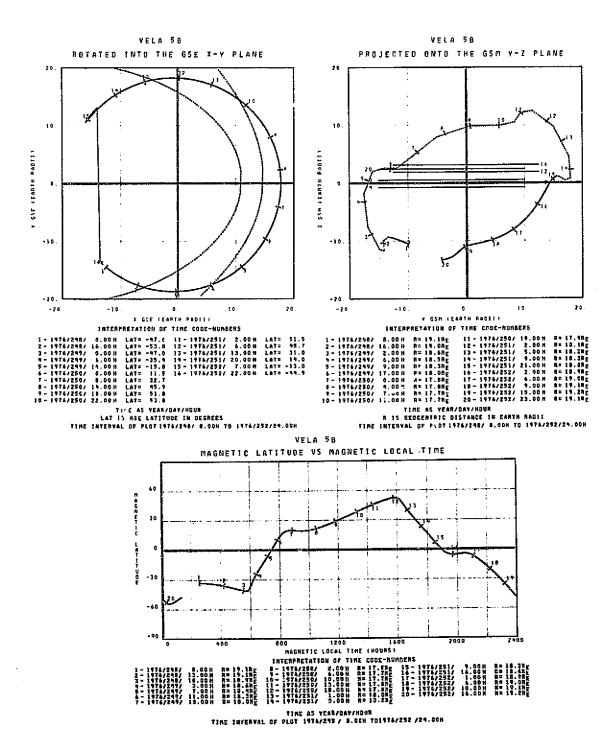
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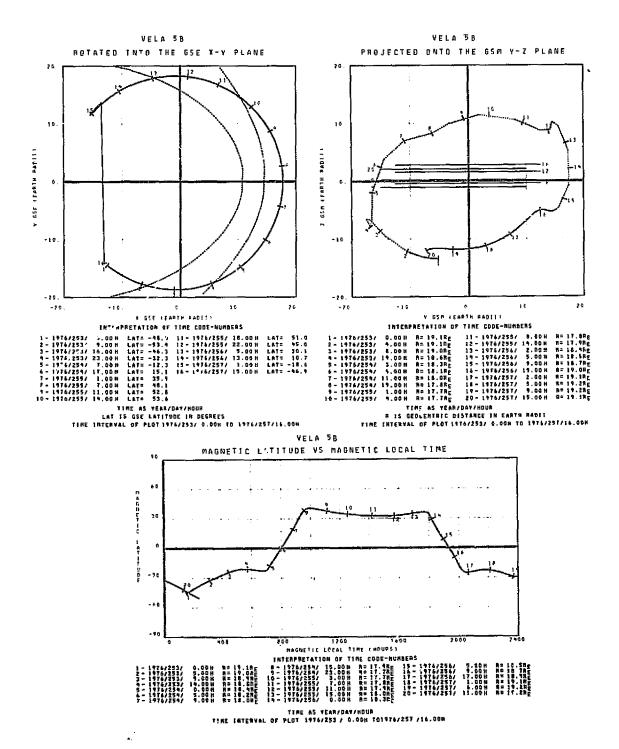
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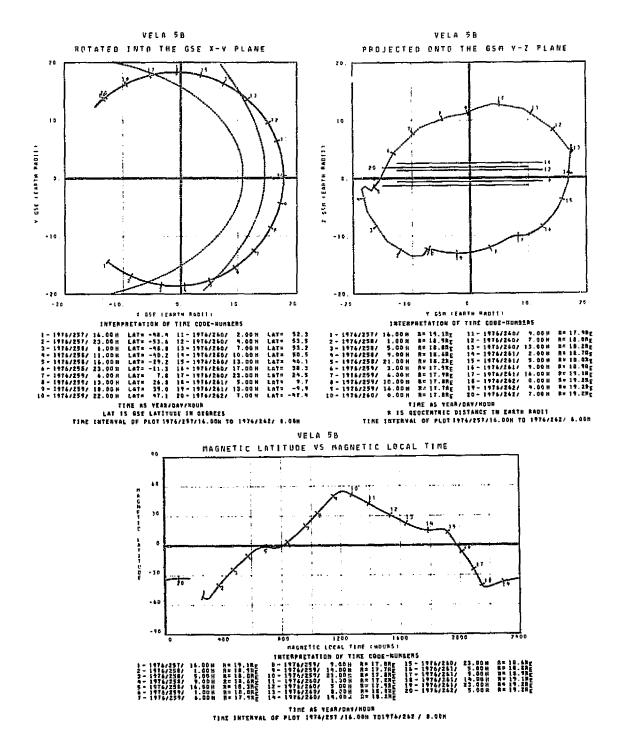


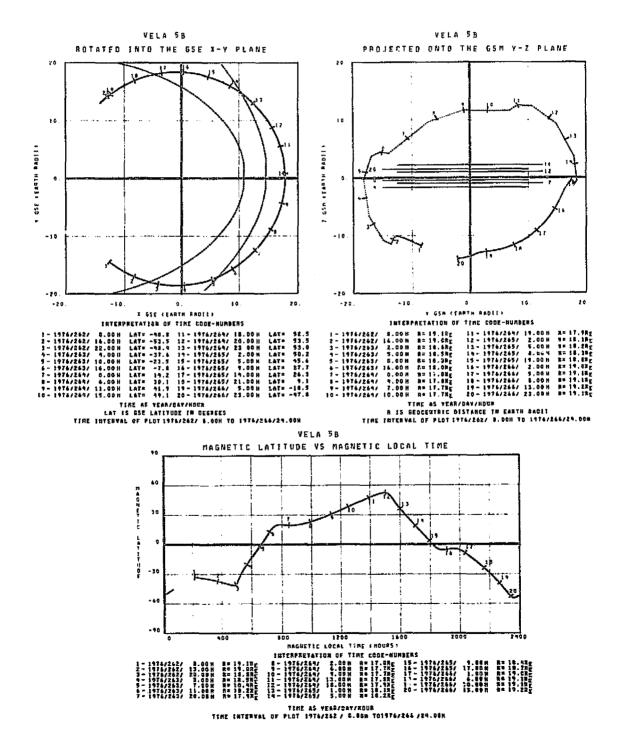


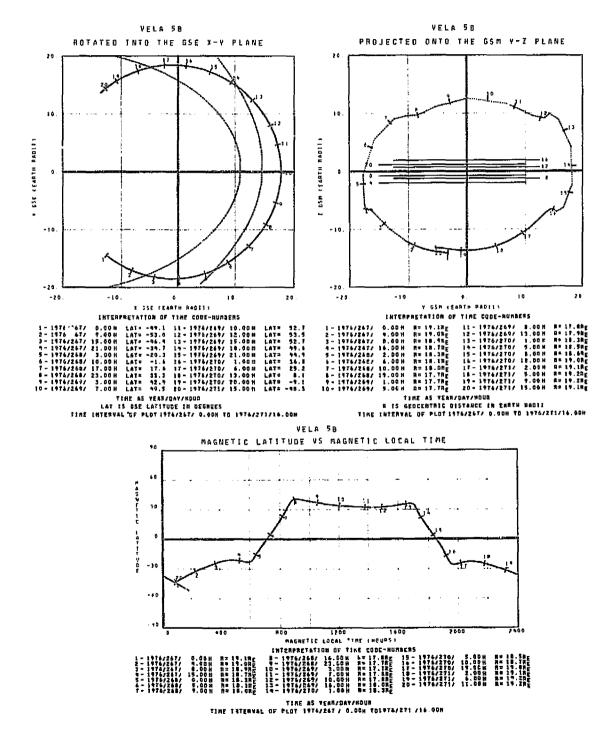


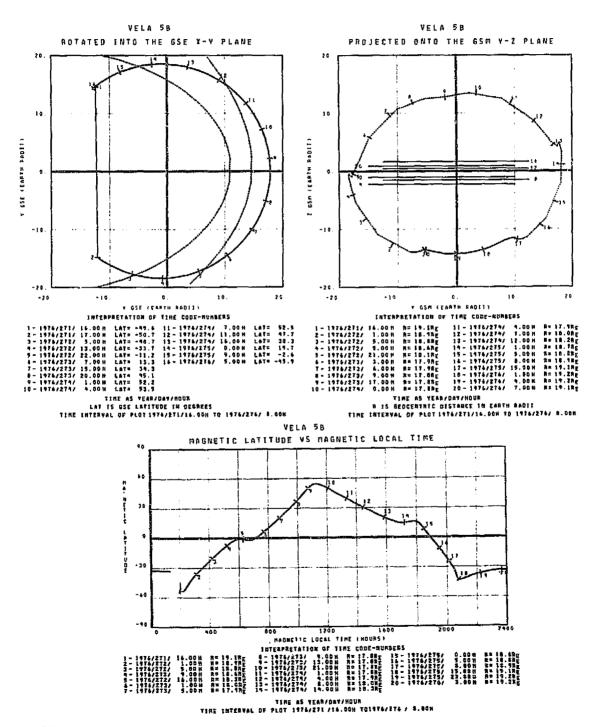
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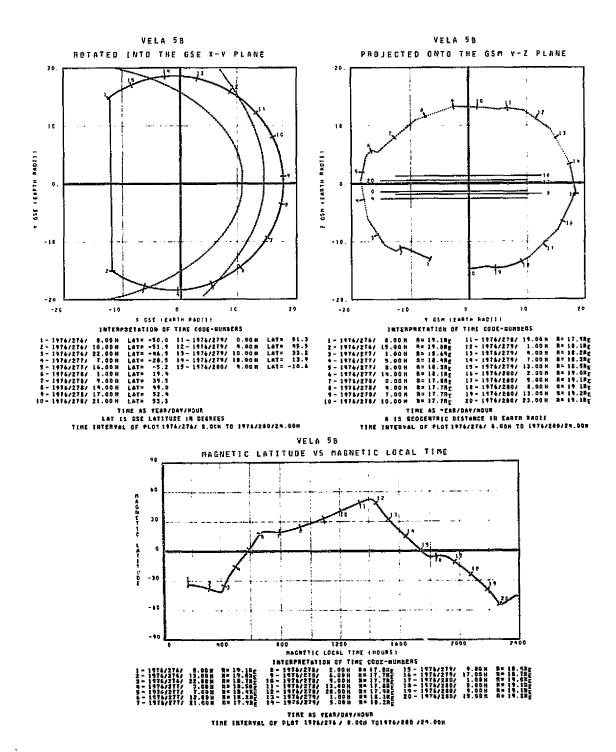


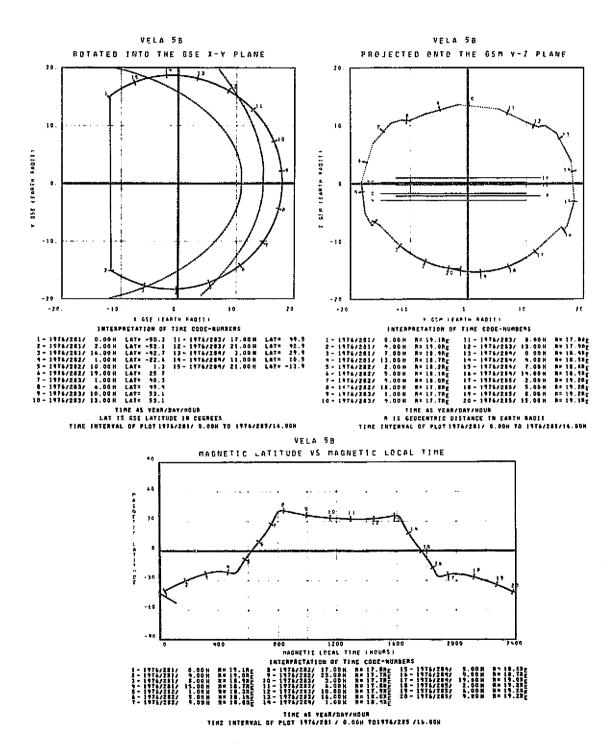




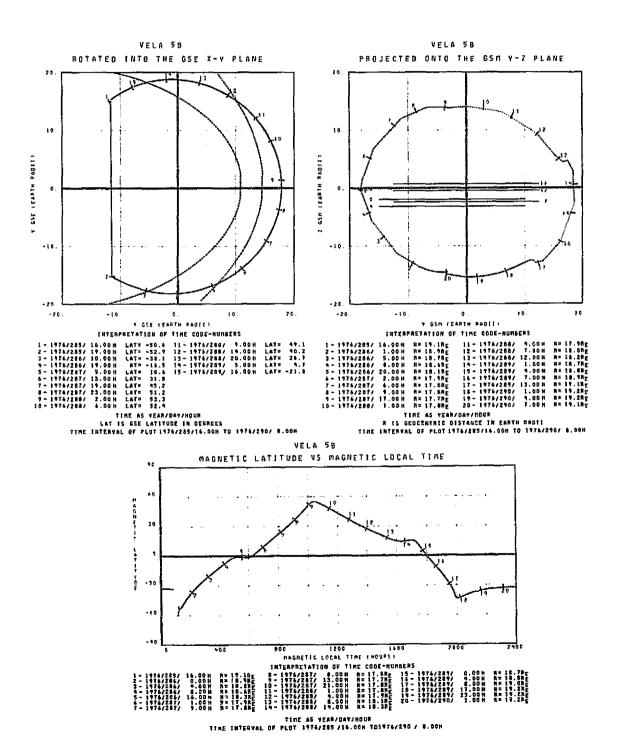


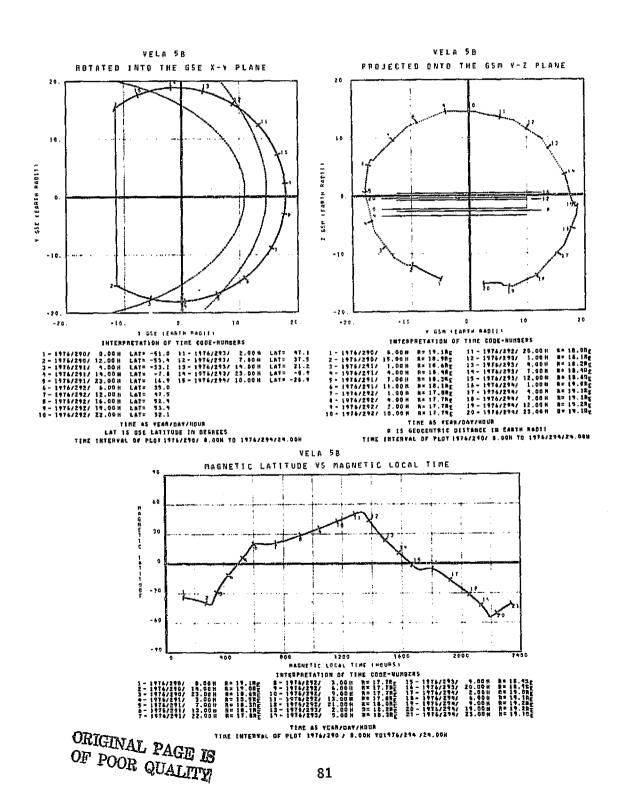
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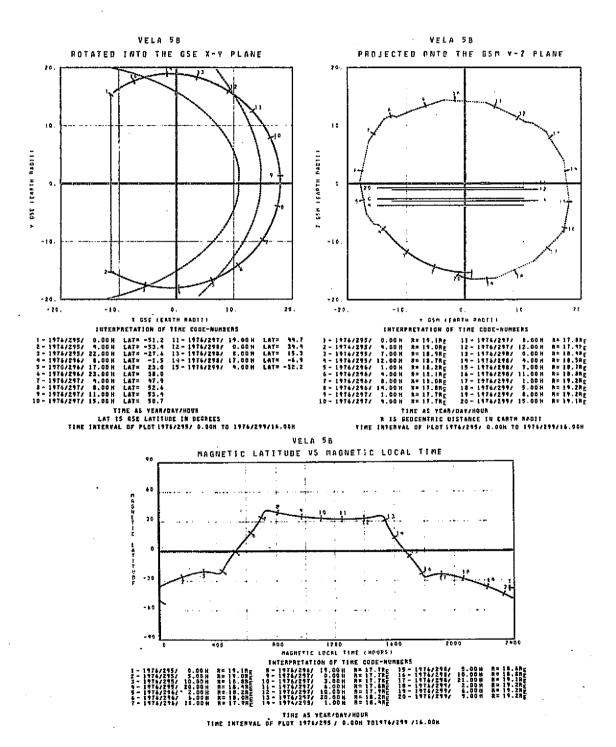


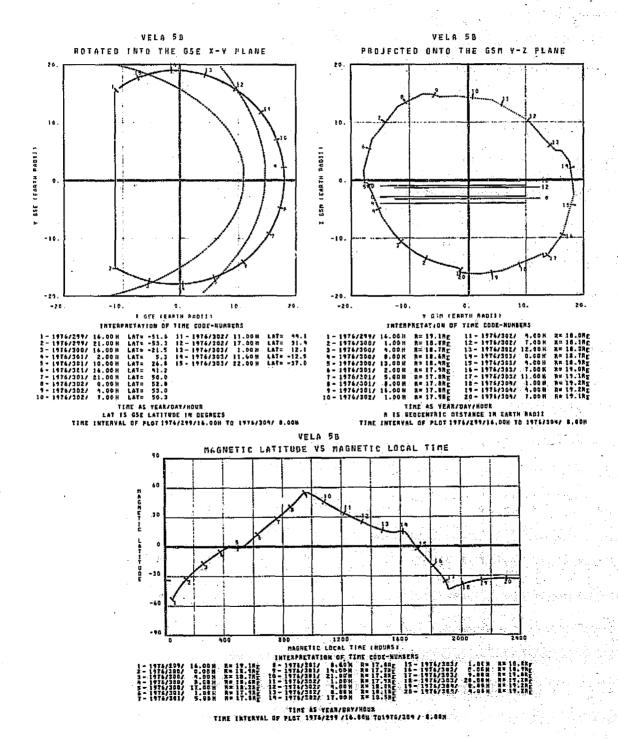
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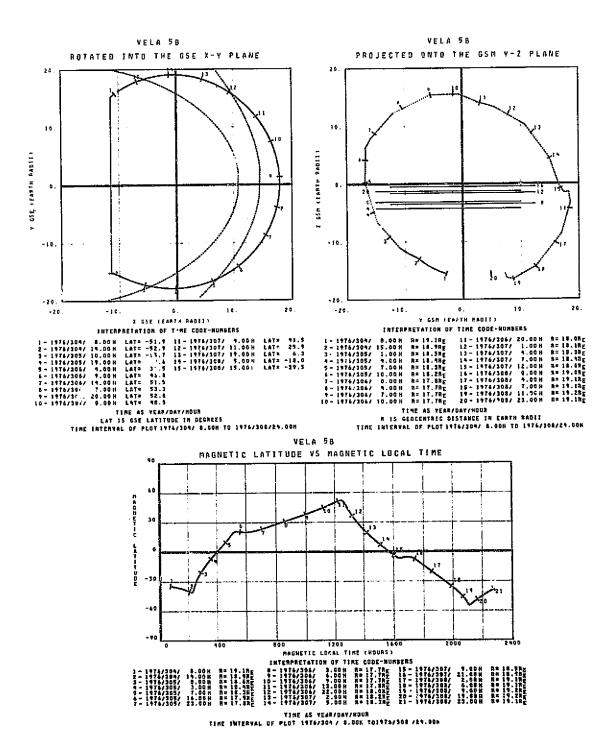


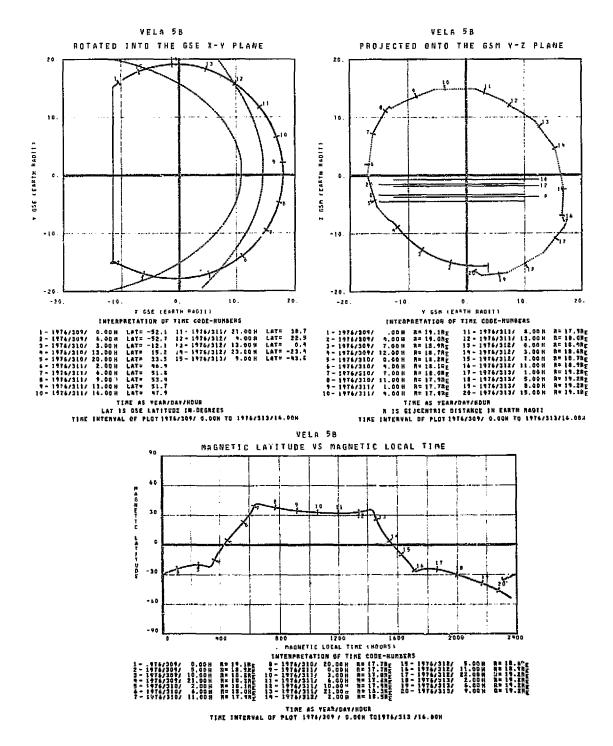


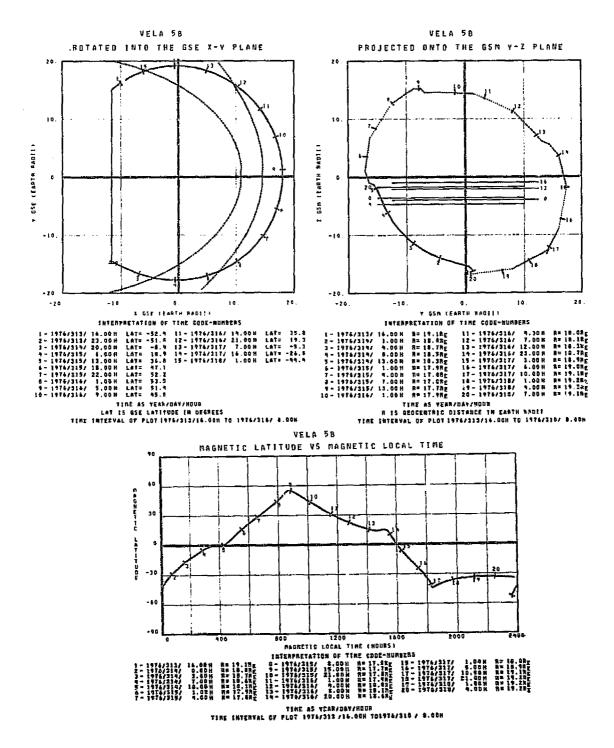
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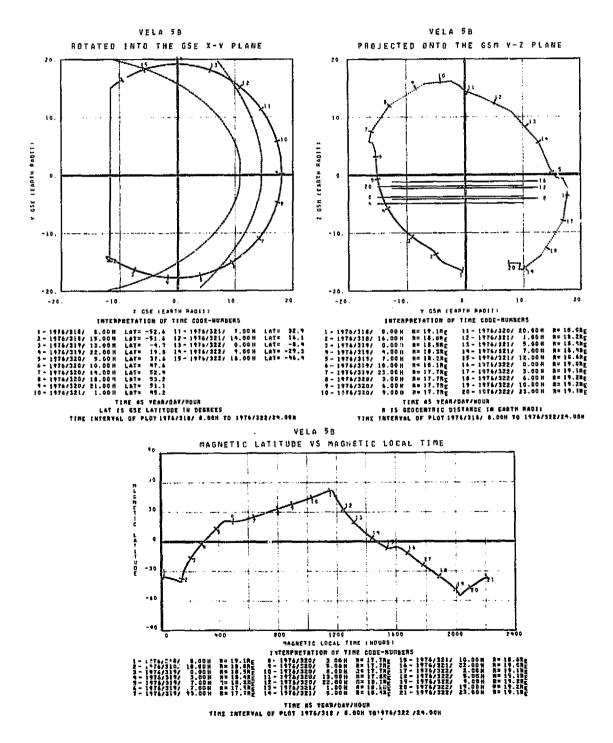






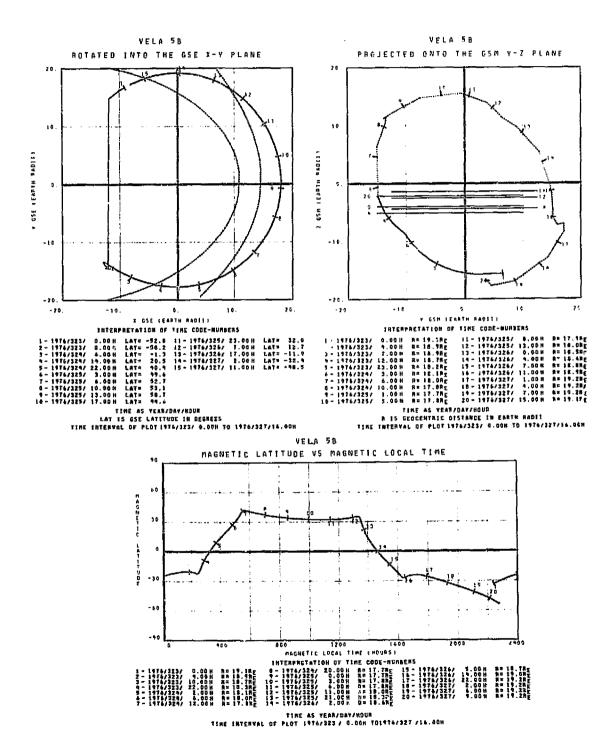
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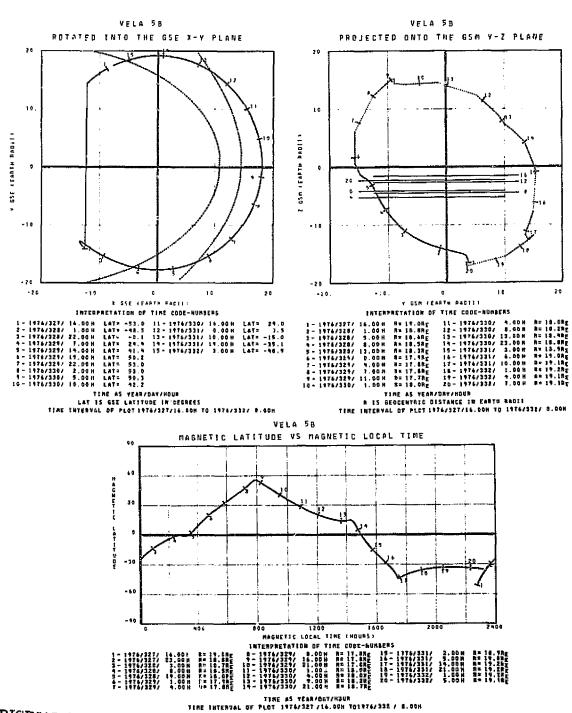
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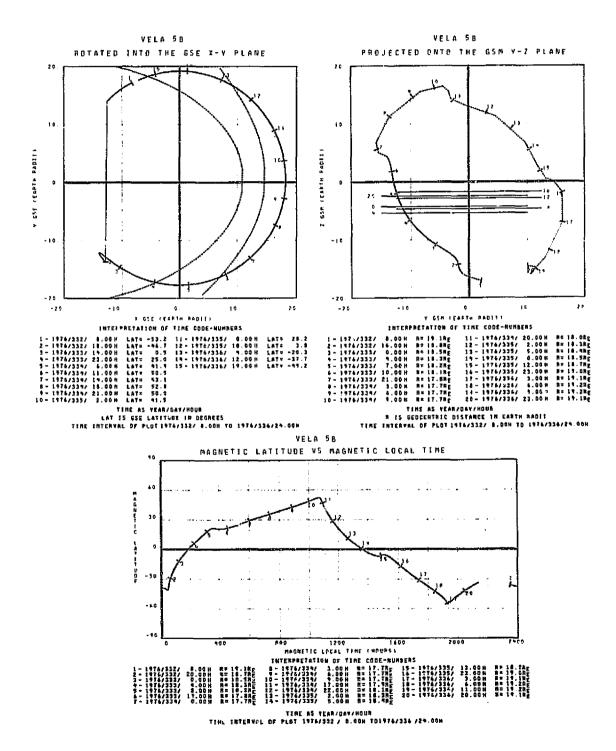
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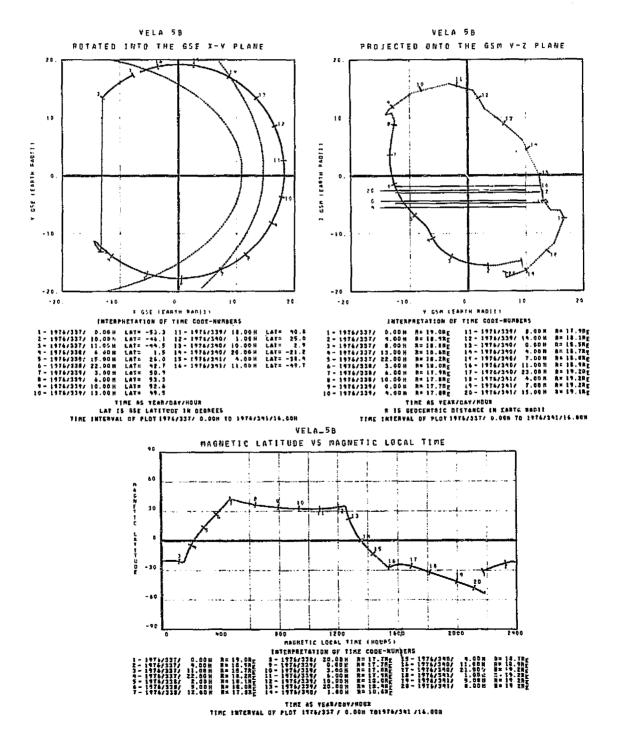
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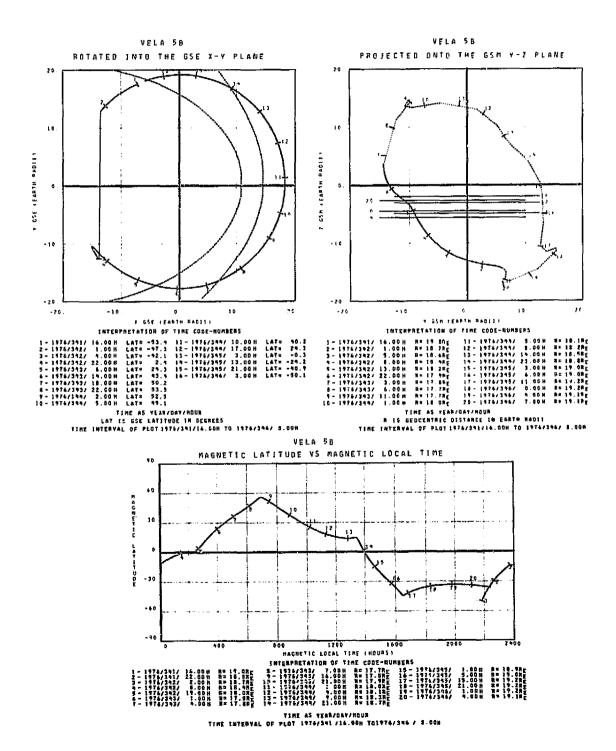




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